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AERONAUTICAL ENGINEERING

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s); Availability and Price Codes
7. Abstract
8. Abstract Author
9. Subject Terms

AERONAUTICAL ENGINEERING

A Continuing Bibliography (Suppl. 370)

MARCH 20, 1998

01
AERONAUTICS

19980013112

Aerospace thermal-structural testing technology

Thornton, Earl A., Univ. of Virginia, USA; Applied Mechanics Reviews; September, 1997; ISSN 0003-6900; Volume 50, no. 9, pp. 477-498; In English; 1997 2nd International Symposium on Thermal Stresses, Jun. 8-11, 1997, Cracow, Poland; Copyright; Avail: Issuing Activity

This review article describes aerospace thermal-structural testing technology. It begins with discussions of aerodynamic heating and space radiation heating. The review continues with a general discussion of thermal-structural test technology including heating and cooling, instrumentation, and thermal-structural boundary conditions. Then illustrative thermal structural tests are presented for high speed flight in the atmosphere and flight in space. Experiments conducted in the laboratory as well as flight tests are described. Several experiments are reviewed to demonstrate the diversity of thermal-structural phenomena.
Author (EI)

Flight Tests; Aerospace Engineering; Technologies; Aerodynamic Heating; Heating

19980013135 Louisiana State Univ., Dept. of Electrical and Computer Engineering, Baton Rouge, LA USA

Modeling and Control of Uncertain Systems with Applications to Air Force Problems ***Final Report, 1 Sep. 1994 - 31 Aug. 1997***

Gu, Guo-Xiang, Louisiana State Univ., USA; Aug. 1997; 26p; In English

Contract(s)/Grant(s): F49620-94-I-0415

Report No.(s): AD-A332660; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The paper addresses modeling and control of uncertain systems with applications to Air Force problems.
Derived from text

Control Theory; Control Stability

19980014486

Assessment of preconditioning methods for multidimensional aerodynamics

Turkel, E., Tel-Aviv Univ., Israel; Radespiel, R.; Kroll, N.; Computers & Fluids; July, 1997; ISSN 0045-7930; Volume 26, no. 6, pp. 613-634; In English; Copyright; Avail: Issuing Activity

We consider the steady state equations for a compressible fluid. For low speed flow the system is stiff since the ratio of the convective speed to the speed of sound is very small. to overcome this difficulty we alter the time dependency of the equations while retaining the same steady state operator. In order to achieve high numerical resolution we also alter the artificial dissipation (or Roe matrix) of the numerical scheme. The definition of preconditioners and artificial dissipation terms can be formulated conveniently by using other sets of dependent variables rather than the conservation variables. The effects of different preconditioners, artificial dissipation and grid density on accuracy and convergence to the steady state of the numerical solutions are presented in detail. The numerical results obtained for inviscid and viscous two- and three-dimensional flows over external aerodynamic bodies indicate that efficient multigrid computations of flows with very low Mach numbers are now possible.
Author (EI)

Equations of State; Mach Number; Steady State; Compressible Flow; Aerodynamics; Numerical Analysis; Algorithms; Convergence

19980016306 National Materials Advisory Board, Washington, DC USA
New Materials for Next-Generation Commercial Transports
1996; 94p; In English
Report No.(s): PB96-181680; NMAB-476; Copyright Waived; Avail: CASI; A05, Hardcopy; A01, Microfiche

The major objective of the study was to identify issues related to the introduction of new materials and the effect that advanced materials will have on the durability and technical risk of future civil aircraft throughout their service life. The report presents new materials and structural concepts that are likely to be incorporated into next-generation commercial aircraft and the factors influencing application decisions.

NTIS
Aircraft Construction Materials; Research and Development; Commercial Aircraft; Transport Aircraft

19980016374 Federal Aviation Administration, Washington, DC USA
Federal Aviation Regulations. Part 43, Maintenance, Preventive Maintenance, Rebuilding and Alteration. Change 2
May 31, 1996; 19p; In English
Report No.(s): PB96-194022; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This change incorporates two amendments: Amendment 43-35, Revision of Authority Citations, effective December 28, 1995, and Amendment 43-36, Revisions to Maintenance and Preventive Maintenance Rule, effective May 31, 1996. Amendment 43-36 revises Sections 43.3, 43.7(d), and 43.11(b) and adds (c)(31) and (c)(32) to Appendix A.

NTIS
Regulations; Maintenance; Aerospace Vehicles; Prevention

19980016425
Revolution in air power at sea for the next century
Burnett, Robin; Naval Architect; July-August, 1997; ISSN 0306-0209, pp. 55-57, 59; In English; Copyright; Avail: Issuing Activity

The RINA's Warship '97 conference emphasized the urgent need to address ship design problems with respect to landing helicopters on deck. Air operations have to be optimized among other ship requirements but there are problems to be resolved with ships whose helicopter landing spots cannot be properly used because of air turbulence. The conference revealed a wide ranging of innovative approach to revolutionary future aircraft carrier design and recognized the serious problems of aircraft handling particularly in small and hybrid types as helicopters get larger.

EI
Aircraft Carriers; Ships; Military Helicopters; Aircraft Landing; Turbulence

19980016571 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France
Future Aerospace Technology in the Service of the Alliance, Volume 2, Mission Systems Technologies ***Les Technologies Aeronautiques et Spatiales du Futur au Service de L'Alliance Atlantique, Volume 2, Les Technologies des Systemes de Conduite de Mission***
Future Aerospace Technology in the Service of the Alliance; Dec. 1997; 184p; In English; In French; The AGARD Symposium on 'Future Aerospace Technology in the Service of the Alliance', 14-17 Apr. 1997, Palaiseau, France; Also announced as 19980016572 through 19980016587
Report No.(s): AGARD-CP-600-Vol-2; ISBN 92-836-0048-7; Copyright Waived; Avail: CASI; A09, Hardcopy; A02, Microfiche

Advances in sensing and information processing/distribution technologies will enable highly innovative system concepts for achieving unprecedented improvements in military mission capabilities. Assessing those major technology advances, the symposium was structured in five sessions hosting twenty four papers: (1) Mission management concepts, introducing the subject, presenting technological requirements and giving as an example the unmanned tactical aircraft; (2) Sensors and electronic warfare, showing how emerging Radio Frequency and Electro-Optics technologies are able to offer improved situational awareness, but may also defeat apparently reliable weapons; (3) Information and communications systems, stressing the effective blending most likely to occur between market driven and specific military developments, as well as the need to account for the battlespace environment; (4) Information fusion and mission systems integration, demonstrating among others how data fusion which is required for matching the information rate to the human, will result in drastically improving its accuracy and reliability; and (5) System simulation, emphasizing the major role of simulation technologies for cost-effective design of new military systems, evaluation of existing ones, training of operators, and paving the way to the concept of synthetic environments. Based on emerging and rapidly evolving technologies, the presenters built a vision of future weapon systems capable of operating in a diverse range of hostile environments, under all weather conditions, and during day or night. Furthermore, autonomous situation appreciation capability,

reliable communication channels and real-time decision aids were discussed, which will drastically reduce the operators' reaction time and prevent overload in a high target and threat density environment. The fruitful interaction with the audience confirmed the unique opportunity offered by this classified symposium to bring together experts working in the relevant sciences as well as the user community, and affiliated either with academia, industry, government organisations, or military services.
Author
Mission Planning; Weapon Systems; Conferences; Electronic Warfare; Military Operations; Systems Engineering; Artificial Intelligence; Decision Making; Pattern Recognition; Global Positioning System; Telecommunication; Aircraft Detection; Avionics

02
AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

19980011200
Comparison of turbulence models for attached boundary layers relevant to aeronautics
Henkes, R. A. W. M., Delft Univ. of Technology, Netherlands; Applied Scientific Research (The Hague); 1996/1997; ISSN 0003-6994; Volume 57, no. 1, pp. 43-65; In English; Copyright; Avail: Issuing Activity

With a single numerical method the performance of three classes of turbulence models is compared for different types of attached boundary layers, for which direct numerical simulations or experiments are available in the literature. The boundary-layer equations are solved with the following turbulence models: an algebraic model, two-equation models (k - epsilon and k - omega), and a differential Reynolds-stress model. The test cases are the channel flow, and boundary layers with zero, favourable and adverse streamwise pressure gradient. The differential Reynolds-stress model gives the best overall performance, whereas the performance of the algebraic model and the k - omega model is reasonably good. The performance of the k - epsilon model is less good for boundary layers with a non-zero streamwise pressure gradient, but it can easily be improved by an additional source term in the epsilon equation, which is also applied in the considered differential Reynolds-stress model.
Author (EI)
Boundary Layer Equations; Boundary Layers; Turbulence Models; Turbulence; Mathematical Models; Numerical Analysis

19980013923 Naval Postgraduate School, Monterey, CA USA
Aerodynamic Analysis of a Modified, Pylon-Mounted JSOW/CATM Using Multi-Grid CFD Methods
Pomerantz, Boaz, Naval Postgraduate School, USA; Mar. 1997; 168p; In English
Report No.(s): AD-A331636; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Computational Fluid Dynamics (CFD) has become a major tool in aerodynamic analysis throughout the aerospace industries, complementary to traditional methods such as wind tunnel testing, and analytical calculations. In this research, an attempt was made to integrate the Similarity and Area Rules with CFD methods. Both tools, the Similarity/Area Rule and CFD are used to derive the characteristics of complicated aerodynamic shapes in the transonic Mach number regime. It was found that the Similarity Rule can only be verified qualitatively. On the other hand, the Area Rule can be more completely verified. The aim was to find ways to minimize the drag of the training configurations of the Air-to-Ground (A/G) weapon, Joint-Standoff-Weapon (JSOW), in its Captive-Air-Training-Missile (CATM) configuration. by analyzing the combination of CATM and Pylon, it was found that the drag of this configuration depends on the average slope of the area cross-section distribution of the afterbody. The CFD tools used were a state-of-the-art grid generation code, GRIDGEN, and a multi-grid integration code, PEGSUS; the configurations were run with the OVERFLOW solver using Euler, as well as Navier-Stokes solutions. For drag optimization, Euler solutions give adequate results, the need for NS solution can be restricted to more intensity viscous analysis.
DTIC
Computational Fluid Dynamics; Aerodynamic Characteristics; Design Analysis; Mach Number; Drag; Education; Aerospace Industry

19980015109 NASA Ames Research Center, Moffett Field, CA USA
Development of High Speed Interferometry Imaging and Analysis Techniques for Compressible Dynamic Stall
Chandrasekhara, M. S., Naval Postgraduate School, USA; Carr, L. W., NASA Ames Research Center, USA; Wilder, M. C., MCAT Inst., USA; Sep. 1997; 13p
Contract(s)/Grant(s): ARO-MIPR-133-94
Report No.(s): AD-A332283; NASA/TM-97-206787; NAS 1.26:206787; ARO-32480-10-EG; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The development of a high speed, phase locked, real time, point diffraction interferometry system for quantitative imaging of unsteady separated flows is described. The system enables recording of up to 224 interferograms of the dynamic stall flow over an oscillating airfoil using a drum camera at rates of up to 40 KHz, controlled by custom designed electronic interlocking circuitry. Several thousand interferograms of the flow have been obtained using this system. A comprehensive image analysis package has been developed for automatic processing of this large number of images. The software has been specifically tuned to address the special characteristics of airfoil flow interferograms. Examples of images obtained using the standard and the high speed interferometry techniques are presented along with a demonstration of the image processing routine's ability to resolve the fine details present in these images.
DTIC
Compressible Flow; Image Processing; Flow Visualization; Unsteady Flow; Aerodynamic Stalling; Image Analysis; Interferometry; Real Time Operation; Separated Flow

19980015746 NERAC, Inc., Tolland, CT USA
Parachutes. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)
Jan. 1996; In English
Report No.(s): PB96-859509; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning design, fabrication, and testing of parachutes and decelerating devices that use aerodynamic drag. Designs for the canopy, shrouds, and hardware, and operating components, including canopy opening, actuators, staging, reefing, maneuvering, and separation and release mechanisms, are reviewed. Applications include deployment from aircraft for escape or air drop missions, aerial delivery of equipment and munitions, and recovery of drones. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Parachutes

19980016543 NASA Lewis Research Center, Cleveland, OH USA
Experimental Evaluation of the Penalty Associated With Micro-Blowing for Reducing Skin Friction
Hwang, Danny P., NASA Lewis Research Center, USA; Biesiadny, Tom J., NASA Lewis Research Center, USA; Dec. 1997; 12p; In English; 36th; Aerospace Science, 12-15 Jan. 1998, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): RTOP 274-00-00
Report No.(s): NASA-TM-113174; NAS 1.15:113174; AIAA Paper-97-0677; E-10938; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A micro-blowing technique (MBT) experiment was conducted in the Advanced Nozzle and Engine Components Test Facility at the NASA Lewis Research Center. The objectives of the test were to evaluate the pressure-drag penalty associated with the MBT and to provide additional information about the porous plates used for micro-blowing. The results showed that 1 of 12 plates tested could reduce the total drag (skin-friction drag plus pressure drag) below a solid flat plate value. The results of this experiment and prior data showed that a total drag reduction below a solid flat plate value was possible. More tests are needed to find an optimal MBT skin and to find a technique to reduce pressure drag.
Author
Skin Friction; Friction Reduction; Drag Reduction

19980016567 Florida State Univ., Dept. of Mechanical Engineering, Tallahassee, FL USA
Thrust-Induced Effects on a Pitching-Up Delta Wing Flow Field: Control of Stalled Wings ***Final Report, 1 Sep. 1994 - 31 Aug. 1995***
VanDommelen, L., Florida State Univ., USA; Nov. 22, 1995; 5p; In English
Contract(s)/Grant(s): F49620-93-I-0568
Report No.(s): AD-A329654; FMRL-TR95-2; AFOSR-TR-97-0416; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Neural network procedures were explored with the objectives to control a delta wing in the non-linear domain. Results show that neural networks are well suited to represent non-linear computed lift and pressure forces on delta wings. A model problem,

the flare maneuver, suggests that neural network controllers can perform well for non-linear systems provided that suitable input and training data are provided to it.
DTIC
Neural Nets; Aerodynamic Stalling; Delta Wings; Lift

19980016874 Japan Atomic Energy Research Inst., Tokyo, Japan
A conceptual design of multidisciplinary-integrated CFD simulation on parallel computers
Onishi, Ryoichi, Japan Atomic Energy Research Inst., Japan; Ohta, Takashi, Japan Atomic Energy Research Inst., Japan; Kimura, Toshiya, Japan Atomic Energy Research Inst., Japan; Nov. 1996; 63p; In Japanese
Report No.(s): JAERI-Data/Code-96-031; DE97-736281; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

A design of a parallel aeroelastic code for aircraft integrated simulations is conducted. The method for integrating aerodynamics and structural dynamics software on parallel computers is devised by using the Euler/Navier-Stokes equations coupled with wing-box finite element structures. A synthesis of modern aircraft requires the optimizations of aerodynamics, structures, controls, operabilities, or other design disciplines, and the R and D efforts to implement Multidisciplinary Design Optimization environments using high performance computers are made especially among the U.S. aerospace industries. This report describes a Multiple Program Multiple Data (MPMD) parallelization of aerodynamics and structural dynamics codes with a dynamic deformation grid. A three-dimensional computation of a flowfield with dynamic deformation caused by a structural deformation is performed, and a pressure data calculated is used for a computation of the structural deformation which is input again to a fluid dynamics code. This process is repeated exchanging the computed data of pressures and deformations between flowfield grids and structural elements. It enables to simulate the structure movements which take into account of the interaction of fluid and structure. The conceptual design for achieving the aforementioned various functions is reported. Also the future extensions to incorporate control systems, which enable to simulate a realistic aircraft configuration to be a major tool for Aircraft Integrated Simulation, are investigated.
DOE
Computerized Simulation; Aircraft Configurations; Multidisciplinary Design Optimization; Parallel Computers; Navier-Stokes Equation; Aircraft Design; Euler Equations of Motion; Computational Fluid Dynamics; Aeroelasticity; Dynamic Structural Analysis; Finite Element Method; Aircraft Structures; Aerodynamics

03
AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

19980014450 Embry-Riddle Aeronautical Univ., Daytona Beach, FL USA
General Aviation Night Fatal Accidents ***Final Report, Jan. 1985 - Dec. 1994***
Jorgensen, Richard J., Embry-Riddle Aeronautical Univ., USA; Sep. 1997; 47p; In English
Report No.(s): AD-A330954; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this research was to ascertain whether a significantly disproportionate number of general aviation fatal aircraft accidents occur at night. The percentage of all fatal accidents that occur at night, collected over a ten year span, were compared to the percentage of hours flown at night. Research determined that there is a significantly disproportionate number of night fatal accidents. An additional area examined was whether a significantly larger proportion of night (versus day) fatal accidents had inflight encounter with weather as the first occurrence (the first of any number of occurrences or events which contribute to an accident) . The study resolved that a significantly higher percentage of night accidents have inflight encounter with weather as the first occurrence.
DTIC
Aircraft Accidents; General Aviation Aircraft; Weather

19980014521 Army Safety Center, Fort Rucker, AL USA
Flightfax: Army Aviation Risk-Management Information, Volume 26
Nov. 1997; 12p; In English
Report No.(s): AD-A331580; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This periodical deals with all aspects of army Aviation. Some of the topics are: (1) auxillary fuel tank operations; (2) risk management lessons learned; (3) ANVIS maintenance; (4) accidents brief; and (5) aviation messages.
DTIC
Risk; Management Information Systems; Accident Prevention; Flight Safety

19980015208 Eurocontrol Experimental Centre, Bretigny, France
3rd Continental RVSM Real-Time Simulation
Lane, R., Eurocontrol Experimental Centre, France; Deransy, R., Eurocontrol Experimental Centre, France; Seeger, D., Eurocontrol Experimental Centre, France; Jul. 1997; 104p; In English
Report No.(s): PB98-114812; EEC-315; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
The S08 Real Time Simulation was the third Continental Reduced Vertical Separation Minima (RVSM) Simulation to be conducted at the EUROCONTROL Experimental Centre (EEC) at Bretigny, France. The aim of the simulation was to continue to study the benefits of the Single and Double Alternate FLOS within the core area of European airspace using a Multi-Air Traffic Control Center (ATCC) environment.
NTIS
Air Traffic Control; Computerized Simulation; Airspace; Civil Aviation

19980015209 Eurocontrol Experimental Centre, Bretigny, France
Space System Safety Case: Impact Study, Volume 1
Fletcher, P. A., Eurocontrol Experimental Centre, France; Jun. 1997; 94p; In English
Report No.(s): PB98-114838; EEC-312-V1; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
Volume I of this report reviews the impacts of introducing a Space System Safety Case into the safety regulation of radio navigation services. The report also identifies the need for local (State) and international regulatory frameworks to support a Safety Case regime and assists in defining one possible structure and its implications.
NTIS
Radio Navigation; Civil Aviation; Systems Engineering; Safety Factors

19980016626 Commission on Aviation Safety and Security, Washington, DC USA
White House Commission on Aviation Safety and Security *Final Report*
Gore, A., Commission on Aviation Safety and Security, USA; Feb. 12, 1997; 98p; In English
Report No.(s): PB97-166169; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche
The President established the White House Commission on Aviation Safety and Security on August 22, 1996 with a charter to study matters involving aviation matters involving aviation safety and security, including air traffic control and to develop a strategy and security, both domestically and internationally. The Commission and staff conducted an intensive inquiry into civil aviation safety, security and air traffic control modernization. The publication provides recommendations which should enhance and ensure the continued safety and security of air transportation.
NTIS
Security; Flight Safety; Aircraft Safety

19980016628 National Transportation Safety Board, Washington, DC USA
National Transportation Safety Board Transportation Initial Decisions and Orders and Board Opinions and Orders Adopted and Issued during the Month of February 1996
Feb. 1996; 189p; In English
Report No.(s): PB96-916702; NTSB/IDBOO-96/02; Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
This publication contains all Judge Initial Decisions and Board Opinions and Orders in Safety Enforcement and Seaman Enforcement Cases for February 1996.
NTIS
Safety Management; Transportation

19980016705 NASA Lewis Research Center, Cleveland, OH USA

NASA/FAA/NCAR Supercooled Large Droplet Icing Flight Research: Summary of Winter 1996-1997 Flight Operations

Miller, Dean, NASA Lewis Research Center, USA; Ratvasky, Thomas, NASA Lewis Research Center, USA; Bernstein, Ben, National Center for Atmospheric Research, USA; McDonough, Frank, National Center for Atmospheric Research, USA; Strapp, J. Walter, Atmospheric Environment Service, Canada; Jan. 1998; 24p; In English; 36th; Aerospace Sciences Meeting and Exhibit, 12-15 Jan. 1998, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Contract(s)/Grant(s): RTOP 548-20-23

Report No.(s): NASA/TM-1998-206620; E-11054; NAS 1.15:206620; AIAA Paper 98-0577; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

During the winter of 1996-1997, a flight research program was conducted at the NASA-Lewis Research Center to study the characteristics of Supercooled Large Droplets (SLD) within the Great Lakes region. This flight program was a joint effort between the National Aeronautics and Space Administration (NASA), the National Center for Atmospheric Research (NCAR), and the Federal Aviation Administration (FAA). Based on weather forecasts and real-time in-flight guidance provided by NCAR, the NASA-Lewis Icing Research Aircraft was flown to locations where conditions were believed to be conducive to the formation of Supercooled Large Droplets aloft. Onboard instrumentation was then used to record meteorological, ice accretion, and aero-performance characteristics encountered during the flight. A total of 29 icing research flights were conducted, during which ”conventional” small droplet icing, SLD, and mixed phase conditions were encountered aloft. This paper will describe how flight operations were conducted, provide an operational summary of the flights, present selected experimental results from one typical research flight, and conclude with practical ”lessons learned” from this first year of operation.

Author

Aircraft Icing; Ice Formation; Real Time Operation; Research Projects

19980016827 National Transportation Safety Board, Washington, DC USA

Annual Review of Aircraft Accident Data. U.S. Air Carrier Operations, Calendar Year 1994

Sep. 18, 1996; 73p; In English

Report No.(s): PB96-145180; NTSB/ARC-96/01; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The publication presents the record of aviation accidents involving revenue operations of U.S. Air Carriers including Commuter Air Carriers and On Demand Air Taxis for calendar year 1994. The report is divided into three major sections according to the federal regulations under which the flight was conducted - 14 CFR 121, Scheduled 14 CFR 135, or Nonscheduled 14 CFR 135. In each section of the report tables are presented to describe the losses and characteristics of 1994 accidents to enable comparison with prior years.

NTIS

Air Transportation; Aircraft Accidents; General Aviation Aircraft

04
AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

19980012662

Multilevel organization design: The case of the air traffic control

Vanderhaegen, F., Universite de Valenciennes et du Hainaut-Cambresis, France; Control Engineering Practice; March, 1997; ISSN 0967-0661; Volume 5, no. 3, pp. 391-399; In English; Copyright; Avail: Issuing Activity

This paper presents a multilevel human-machine organization study based on the working position concept. A methodology for designing this kind of system is proposed. The resulting organization is then described as a complex communication network between the human and technical control systems of each working position. This global communicative system representation is illustrated for the highly cooperative air traffic control organization. Finally, the impact of new air traffic control tools is discussed through experimental and field studies.

Author (EI)

Air Traffic Control; Man Machine Systems; Active Control; Distributed Parameter Systems; Human Factors Engineering; Control Systems Design

19980014530 Virginia Transportation Research Council, Charlottesville, VA USA

Case Studies in Collecting Highway Inventory Data with the Global Positioning System ***Final Report***

Brich, S. C., Virginia Transportation Research Council, USA; Fitch, G. M., Virginia Transportation Research Council, USA; May 1996; 79p; In English

Report No.(s): PB96-178868; VTRC-96-R34; Copyright Waived; Avail: CASI; A05, Hardcopy; A01, Microfiche

A number of state departments of transportation, including the Virginia Department of Transportation (VDOT), are developing a geographic information system (GIS) to integrate data and conduct more elaborate analyses that will improve their decision-making capabilities. Research is currently being conducted at the Virginia Transportation Research Council to determine some of the problems associated with the implementation of this relatively new and evolving technology. The collection and development of the data sets required to drive the GIS have been identified as two of the largest expenses associated with GIS implementation. This research looked at the feasibility of using the Global Positioning System (GPS) to collect some of the locational and attribute data required to run VDOT's GIS.

NTIS

Geographic Information Systems; Planning; Highways; Inventories; Transportation

19980015335 Washington Univ., Seattle, WA USA

Automatic Transit Location System ***Final Report***

Dailey, D. J., Washington Univ., USA; Haselkorn, M. P., Washington Univ., USA; Guiberson, K., Washington Univ., USA; Lin, P. J., Washington Univ., USA; Feb. 1996; 55p; In English

Report No.(s): PB96-168836; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This project provides a state-of-the-art review of AVL technologies which highlights King County METRO Transit's AVL System. This project further demonstrated the use of real-time transit information derived from the Metro AVL system to produce a prototypical display of real-time transit coach locations suitable for wide area Advanced Traveler Information (ATIS) use. This project demonstrated the viability of combining multi-agency data with different technology roots in a single development environment that encourages interagency collaboration in the creation of ITS applications and services. This was accomplished in a rich and flexible development environment, created at the University of Washington and used to leverage a proprietary AVL system to a public ATIS prototype.

NTIS

Navigation; Technologies; Real Time Operation; Prototypes; Position (Location); Automated Transit Vehicles

19980015370 SRI International Corp., Menlo Park, CA USA

Precursor Systems Analyses of Automated Highway Systems. Carrier Phase GPS for AHS Vehicle Control: Resource Materials ***Final Report, Sep. 1993 - Nov. 1994***

Galijan, R. C., SRI International Corp., USA; Jan. 1996; 55p; In English

Contract(s)/Grant(s): DTFH61-93-C-00047

Report No.(s): PB96-168778; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report describs the results of a PSA contract awarded to SRI International to analyze applications of advanced Global Positioning System (GPS) measurement techniques to provide data for lateral and longitudinal control of AHS vehicles. The report includes: (1) a review of control sensor requirements suggested by other PSA contractors and AHS researchers; (2) an indepth discussion of GPS principles of operation, advanced techniques for achieving extremely accurate GPS positioning and velocity data, and techniques for augmenting GPS to provide continuous high-accuracy data; (3) current and expected GPS capabilities and performance; (4) a review of other proposed sensor types for providing lateral and longitudinal control data; (5) a description of a notional architecture and operation of an AHS incorporating GPS; and (6) a preliminary evaluation by SRI of GPS operation in a typical AHS roadway environment.

NTIS

Global Positioning System; Lateral Control; Automatic Control; Highways

19980015386 RE/SPEC, Inc., Rapid City, SD USA

Location Referencing System to Support Data Integration ***Executive Summary***

Vogt, T. J., RE/SPEC, Inc., USA; Svalstad, D. K., RE/SPEC, Inc., USA; Chieslar, J. D., RE/SPEC, Inc., USA; Cooper, F. F., Cooper Technology, USA; May 1997; 21p; In English

Report No.(s): PB97-179493; RSI-0771-ES; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An investigation of South Dakota Department of Transportation (SDDOT) location referencing practices and procedures identified the functional requirements of and specific changes that should be implemented to establish a standard location refer-

encing system that will address SDDOT data integration needs. Critical elements of the proposed location referencing system include a relational database to enhance data access and data management capabilities, coordinate transformation interfaces to enable integration of data from diverse referencing systems, and time data attribute to enable historical data management. The study identified 13 discrete location referencing systems in use, provided insight on data sharing needs and uses of location-reference data, and provided a basis for recommened changes that should be implemented to address SDDOT data integration needs. Implementation alternatives were investigated, and a recommended implementation strategy was defined. A relational DBMS was identified as the preferred DBMS based on comparative analyses of system functionality and life cycle cost and SDDOT institutional constraints.
NTIS
Coordinate Transformations; Data Integration; Data Management; Functional Design Specifications; Relational Data Bases; Systems Integration; Transportation

19980016370 Mitre Corp., McLean, VA USA
Time Division Multiple Access (TDMA) System Description: A One-Step Approach to the Future VHF A/G System
Moody, J. C., Mitre Corp., USA; Mar. 1994; 79p; In English
Report No.(s): AD-A324588; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The current very high frequency (VHF) air/ground (A/G) communication system is based on Double Sideband Amplitude Modulation at a channel spacing of 25 kilohertz (kHz). Communications within this band for air traffic control communications is now almost entirely by voice. The system is approaching capacity in the high traffic density areas of Europe resulting in the need for a new more spectrum efficient radio architecture. European States favor transition to an analog channel split system. This paper describes an alternative approach wherein transition would proceed directly to a digital system. This digital system is based on a time division multiple access (TDMA) approach that maintains the current 25 kHz channelization. This alternative approach emphasizes near term implementation of the voice function with data link functionality to follow later.
DTIC
Air Traffic Control; Amplitude Modulation; Digital Systems; High Frequencies; Systems Engineering; Time Division Multiple Access; Very High Frequencies

19980016582 Draper (Charles Stark) Lab., Inc., Director, Guidance Technology Center, Cambridge, MA USA
High Integrity Global Precision Navigation Systems
Schmidt, George T., Draper (Charles Stark) Lab., Inc., USA; Future Aerospace Technology in the Service of the Alliance; Dec. 1997; Volume 2; 16p; In English; Also announced as 19980016571; Copyright Waived; Avail: CASI; A03, Hardcopy; A02, Microfiche

This paper will focus on the technology trends for (1) inertial sensors, (2) GPS accuracies, and (3) integrated GPS/INS systems, including considerations of jamming, for military platforms and weapons, that will lead to the high integrity, one meter accuracy global precision navigation systems of the future. For inertial sensors, trend-setting sensor technologies applicable to military systems will be described. They are: fiber-optic gyros, silicon micromechanical gyros, resonating beam accelerometers, and silicon micromechanical accelerometers. A vision of the inertial sensor instrument field, and inertial systems for military applications for the next few decades will be given. GPS specified and observed current accuracies will be described, as well as, planned accuracy improvements due to various stages of the WAGE implementation, inter-satellite ranging, and ”all-in-view” tracking. Uses of relative and differential GPS will be discussed. The trend towards tightly-coupled GPS/INS, where both code and carrier tracking loops are aided with inertial sensor information, will be described and the synergistic benefits explored. Some examples of the effects of jamming will be described and expected technology trends to improve system anti-jam capability will be presented.
Author
Global Positioning System; Inertial Navigation; Jamming; Gyroscopes; Military Technology; Inertial Platforms

19980016856 Purdue Univ., School of Civil Engineering, West Lafayette, IN USA
Use of GPS to Enhance Mapping by Photogrammetry *Final Report*
Feeney, Robert, Purdue Univ., USA; Bethel, James, Purdue Univ., USA; vanGelder, Boudewijn, Purdue Univ., USA; Johnson, Steve, Purdue Univ., USA; May 14, 1996; 89p; In English
Contract(s)/Grant(s): Proj. C-36-72B
Report No.(s): PB96-183678; FHWA/IN/JHRP-95/6; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Purdue entered into a research project with the Indiana Department of Transportation (INDOT) to investigate the use of GPS for their photogrammetric projects. This research addressed system operation, calibration, and coordinate accuracy questions. This project implemented and tested GPS equipment and procedures using the INDOT Cessna 206 airplane, and a Wild RC-8

aerial camera, and borrowed (from the manufacturer) GPS receiving equipment. The camera calibration report contains the calibrated focal length, the radial distortion, the coordinates of the principal points, and the fiducial coordinates.
NTIS
Photogrammetry; Aerial Photography; Global Positioning System; Cameras

05
AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

19980012711 European Organization for the Safety of Air Navigation, Experimental Center, Bretigny-sur-Orge, France
Model Accuracy Report for the Base of Aircraft Data (BADA), *Jul. 1994 - Dec. 1996*
Bos, A., European Organization for the Safety of Air Navigation, France; Dec. 1996; 67p; In English
Report No.(s): PB97-140818; EEC-NOTE-29/96; Copyright Waived; Avail: CASI; A04, Hardcopy; A01, Microfiche
An overview is given of the accuracy of 30 aircraft models that have been developed for the Base of Aircraft Data (BADA) over the last 2.5 years. The accuracy for both the aircraft trajectories and the fuel consumption is presented in relation to the reference data that was used.
NTIS
Accuracy; Aircraft Models; Root-Mean-Square Errors; General Overviews

19980012718 Eurocontrol Experimental Centre, Bretigny, France
Aircraft Performance Summary Tables for the Base of Aircraft Data (BADA). Revision 2.5
Bos, A., Eurocontrol Experimental Centre, France; Jan. 1997; 85p; In English
Report No.(s): PB97-140834; EEC/NOTE-3/97; Copyright Waived; Avail: CASI; A05, Hardcopy; A01, Microfiche
A set of aircraft performance summary tables are presented for the 69 aircraft types modeled by the Base of Aircraft Data (BADA) Revision 2.5. For each aircraft type, the performance tables specify the true air speed, rate of climb/descent and fuel flow for conditions of climb, cruise and descent at various flight levels, The performance figures contained within the tables are calculated based on a total-energy model and BADA 2.5 performance coefficients.
NTIS
Aircraft Performance; Climbing Flight; Aircraft Models; Flight Characteristics; Fuel Flow; Airspeed

19980013922 Naval Postgraduate School, Monterey, CA USA
Classification Analysis of Vibration Data from SH-60B Helicopter Transmission Test Facility
Rovenstine, Michael J., Naval Postgraduate School, USA; Mar. 1997; 63p; In English
Report No.(s): AD-A331684; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
Health and Usage Monitoring Systems (HUMS) is an emerging technology in helicopter aviation. The USA Navy is evaluating its viability for use on its helicopter fleet. HUMS uses sensors placed throughout the helicopter to monitor and record vibration signals and numerous other aircraft operating parameters. This thesis evaluates the vibration signals recorded by a HUMS system using a statistical technique called tree structured classification. The goal of the analysis is to demonstrate the technique's ability to predict the presence of faulted components in the transmission of the SH-60B autonomously operated in a Helicopter Transmission Test Facility at Naval Air Warfare Center, Trenton, New Jersey. The analysis is implemented in the statistical software package S-plus (Mathsoft Inc., 1995).
DTIC
Helicopters; Vibration; Health; Viability

19980014100 European Organization for the Safety of Air Navigation, Eurocontrol Experimental Centre, Bretigny-sur-Orge, France
User Manual for the Base of Aircraft Data (BADA), *Feb. 1996 - Jan. 1997*
Bos, A., European Organization for the Safety of Air Navigation, France; Jan. 1997; 90p; In English
Report No.(s): PB97-140842; EEC/NOTE-1/97; Copyright Waived; Avail: CASI; A05, Hardcopy; A01, Microfiche
The Base of Aircraft Data (BADA) provides a set of ASCII files containing performance and operating procedure coefficients for 165 different aircraft types. The coefficients include those used to calculate thrust, drag and fuel flow and those used to specify

nominal cruise, climb and descent speeds. User Manual for Revision 2.5 of BADA provides definitions of each of the coefficients and then explains the file formats. Instructions for remotely accessing the files via Internet are also given.
NTIS
User Manuals (Computer Programs); Aerodynamic Coefficients

19980015155 NERAC, Inc., Tolland, CT USA
Drag Reduction Devices for Aircraft (Latest Citations from the Aerospace Database)
Feb. 1996; In English; Page count unavailable
Report No.(s): PB96-863576; NASA/TM-96-206791; NAS 1.26:206790; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the modeling, application, testing, and development of drag reduction devices for aircraft. Slots, flaps, fences, large-eddy breakup (LEBU) devices, vortex generators and turbines, Helmholtz resonators, and winglets are among the devices discussed. Contour shaping to ensure laminar flow, control boundary layer transition, or minimize turbulence is also covered. Applications include the wings, nacelles, fuselage, empennage, and externals of aircraft designed for high-lift, subsonic, or supersonic operation. The design, testing, and development of directional grooves, commonly called riblets, are covered in a separate bibliography.(Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Drag Reduction; Aerodynamic Drag; Aircraft Structures

19980015162 Eurocontrol Experimental Centre, Bretigny, France
Equivalences Report for the Base of Aircraft Data (BADA)
Boz, A., Eurocontrol Experimental Centre, France; Dec. 1996; 37p; In English
Report No.(s): PB97-141212; EEC/NOTE-30/96-Rev; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Base of Aircraft Data (BADA) provides a set of ASCII files containing performance and operating procedure coefficients for 69 different aircraft types. These are the so-called directly supported models. Besides these 69 aircraft models, there are an additional 96 models that are considered to be equivalent to one of these directly supported models. This report gives an overview of the equivalences added to BADA since the release of the previous version of BADA (2.4).
NTIS
Coefficients; Equivalence

19980015164 Air War Coll., Maxwell AFB, AL USA
The F-22: The Right Fighter for the Twenty-First Century?
Costigan, Michael J., Air War Coll., USA; Aug. 1997; 20p; In English
Report No.(s): AD-A331333; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Quadrennial Defense Review of 1997 may have reaffirmed the need for all three major aircraft modernization programs the F-22, F/A-18E/F, and Joint Strike Fighter but the debate is far from over. The F-22, the most expensive of the three programs, stands out as a lucrative target for budget cutters. Critics are quick to point out that the F-22 was designed during the cold war to defend the North Atlantic Treaty Organization airspace against the Warsaw Pact's numerical superiority. With the cold war long over and the Soviet Union re legated to history, many experts question whether the F-22 is still necessary. They point to the USA's overwhelming dominance in the Persian Gulf War using F-l5Cs as evidence. F-22 proponents counter that the world is still a very dangerous place, and the USA needs the F-22 to ensure air superiority. In this study Lt. Col. Michael J. Costigan, USAF, takes a critical look at the F-22 and its role in our military strategy in the twenty-first century. Although the Soviet Union is gone, the USA may well face regional adversaries who will enjoy numerical superiority while the USA deploys its forces. Use of chemical or biological weapons could slow our deployment considerably while forcing other friendly assets in theater to disperse, further limiting their effectiveness. In this scenario, the argument for the F-22 becomes more compelling. Its innovative technologies provide the F-22 with supercruise, stealth, and integrated avionics, and enable it to guarantee the air superiority so necessary to victory.
DTIC
Airspace; Avionics; Military Operations; North Atlantic Treaty Organization (NATO); Persian Gulf; Politics; Warfare; F-22 Aircraft

19980015220 NERAC, Inc., Tolland, CT USA

National Aerospace Plane Thermal Development. (Latest Citations from the Aerospace Database)

Mar. 1996; In English; Page count unavailable.

Report No.(s): NASA/TM-96-206845; NAS 1.15:206845; PB96-864210; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

The bibliography contains citations concerning thermal properties of the National Aerospace Plane (NASP). Analysis of thermal stress, and methods for determining thermal effects on the plane's supersonic structure are discussed. The citations also review temperature extremes that the vehicle is likely to encounter. (Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Thermal Stresses; Stress Analysis; Aerospace Planes

19980015616 Applied Research Associates, Inc., Raleigh, NC USA

Interface-Driven Multidisciplinary Design of Large-Scale Aircraft Structures ***Final Report, 2 Dec. 1995 - 1 Dec. 1996***

Oakley, David R., Applied Research Associates, Inc., USA; Rhodes, Graham S., Applied Research Associates, Inc., USA; Kruger, Lonny B., Applied Research Associates, Inc., USA; Feb. 1997; 42p; In English

Contract(s)/Grant(s): F33615-96-C-3206; AF Proj. 3005

Report No.(s): AD-A330548; WL-TR-97-3078; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report presents Phase I research to develop an Interface-Driven Design Manager (IDM) that greatly reduces the design cycle time for affordable composite aircraft. The IDM represents a first attempt to fully integrate powerful new interface element and 3-D interactive graphics technology into a single design environment to automate the assembly and analysis of multicomponent global-local models for faster, more accurate composite airframe design. These emerging technologies have the potential for making multidisciplinary design optimization of large-scale composite structures practical and for providing new levels of design automation that are currently not possible. The IDM provides a graphical environment for rapidly assembling global-local models, as well as other complex multicomponent airframe models, from pre-meshed 'stock' components stored in a relational database, without concern for mesh compatibility. The IDM enables the designer to automatically insert components or regions with a highly refined mesh into the coarse mesh of a global model using interface elements. This provides two substantial benefits: (1) detailed local models can be used without remeshing the entire structure thereby substantially reducing the associated engineering cost; and (2) higher accuracy can be achieved in critical regions without substantial increases in computational cost. Both of these benefits make it practical to use higher-fidelity models earlier in the design cycle so that primary structures which are truly optimized for the application of affordable composites are achieved.

DTIC

Composite Materials; Composite Structures; Computational Grids; Computer Graphics; Multidisciplinary Design Optimization; Relational Data Bases

19980016012 Department of the Navy, Washington, DC USA

Neural Network Based Method for Estimating Helicopter Low Airspeed

Schaefer, Carl G., Jr., Inventor, Department of the Navy, USA; Haas, David J., Inventor, Department of the Navy, USA; McCool, Kelly M., Inventor, Department of the Navy, USA; Oct. 24, 1996; 40p; In English

Report No.(s): AD-D018622; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

The present invention relates generally to virtual sensors and, more particularly, to a means and method utilizing a neural network for estimating helicopter airspeed at speeds below about 50 knots using only fixed system parameters (i.e., parameters measured or determined in a reference frame fixed relative to the helicopter fuselage) as inputs to the neural network.

DTIC

Patent Applications; Neural Nets; Airspeed

19980016091 National Defense Industrial Association, Arlington, VA USA

Enhancing Aircraft Survivability: A Vulnerability Perspective, Volume 1

Oct. 21, 1997; 736p; In English; presented at NSIA Aircraft Survivability Symposium, Monterey, CA, 21-23 Oct 97.

Report No.(s): AD-A331602; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche

These papers were presented at the NSIA Aircraft Survivability Symposium. Some of the topics include: Aircraft Vulnerability: A Survey of Combat and Peacetime Experience; A History of the Survivability Design of Military Aircraft; Airline Safety and Security: An International Perspective; Overview of Structural Damage Tolerance History and Trends; Enhancing Sur-

vivability - an Air Force Perspective; Aircraft Fire Safety; Alternatives to Halon: A Status Report; Balancing Survivability Attributes: and The Cost of Mission Success and numerous other topics.
DTIC
Aircraft Survivability; Aircraft Design; Aircraft Safety

19980016129 National Aerospace Lab., Amsterdam, Netherlands
Review of Aeronautical Fatigue Investigations in the Netherlands during the Period March 1993 - March 1995
deJonge, J. B., Editor, National Aerospace Lab., Netherlands; 1997; 46p; In English; 24th; ICAF Conference, 1-2 May 1995, Melbourne, Australia
Report No.(s): PB97-178883; NLR-TP-95102-U; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A brief review is given of work performed in the Netherlands in the field of aeronautical fatigue. Where possible, applicable references are presented.
NTIS
Airframe Materials; Fatigue (Materials); Laminates

19980016574 Science Applications International Corp., McLean, VA USA
Unmanned Tactical Aircraft: A Radically New Tactical Air Vehicle and Mission Concept
Gardner, Pat, Science Applications International Corp., USA; Future Aerospace Technology in the Service of the Alliance; Dec. 1997; Volume 2; 12p; In English; Also announced as 19980016571; Copyright Waived; Avail: CASI; A03, Hardcopy; A02, Microfiche

Unmanned Tactical Aircraft (UTA) is a complete air-power system which enables a general purpose high performance aircraft to perform a full range of lethal missions without the physical presence of a pilot in the aircraft. The system allows the pilot to be virtually present, so that his moral and tactical judgment are retained without exposing him to capture or casualty. Without the pilot, the air vehicle will be optimized for a combination of performance and affordability and can be much less complex and expensive than a comparable manned vehicle. UTAs will be effective in a variety of missions in conflict situations but need not be flown in peacetime beyond minimum maintenance needs; training and mission rehearsal will be done using simulations with the actual virtual pilot interface in the loop. This concept will enable unprecedented affordability in the system. Current estimates are up to 40% reduction in acquisition cost and 50% reduction in operations and support cost. A mix of manned aircraft and UTAS, both exploiting the emerging information architecture for targeting and control provides a distinct new option for national air forces which may be unable to afford a ”full” force structure of manned aircraft in the constrained budget environments of the future.
Author
Pilotless Aircraft; Fighter Aircraft; Remotely Piloted Vehicles; Military Operations; Aircraft Design; Human-Computer Interface

19980016775 Technische Univ., Faculty of Aerospace Engineering, Delft, Netherlands
Optimization of Balanced Field Length Performance of Multi-Engine Helicopters
Muenninghoff, N., Technische Univ., Netherlands; Jun. 1997; 184p; In English
Report No.(s): PB97-208326; M-794; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

The main objective of the study is to develop a tool that computes complete trajectories, addressing the rejected (RTO) and continued (CTO) flight simultaneously and including the all-engines-operating phase, so that complete balanced field lengths (BFL) may be optimized directly. The attention is focused on the optimization of Category A runway takeoff operations of multi-engine helicopters according to FAR Part 29. For this purpose, a direct optimization method, based on discretization using collocation, is applied. First, the results of some helicopter take-off optimizations from earlier studies were reproduced using the direct collocation method, using two software packages, DOVNLPAC and Xgesop. Then, an optimization system was developed, using the software package XGesop. An alternative optimization system was developed as well, that handles both continued take-off and rejected take-off in a more efficient way, so that computation time is reduced and the achievable accuracy, increased. A study on aerodynamic helicopter models has also been conducted, to determine an adequate model as a starting point for the optimization systems; possibilities for modifications are also indicated. For the balanced field length optimizations conducted in this study, a two-dimensional point-mass model including rotor rotational dynamics was used as aerodynamic model.
NTIS
Applications Programs (Computers); Helicopter Control; Aircraft Models; Trajectory Optimization; Computerized Simulation; Nonlinear Programming

19980016779 Vought Corp., Dallas, TX USA

Development of Probabilistic Design Methodology for Composite Structures ***Final Report, Jan. - Dec. 1994***

Gary, P. M., Vought Corp., USA; Riskalla, M. G., Vought Corp., USA; Aug. 1997; 95p; In English

Report No.(s): PB98-102007; Rept-2-51200/5R-003; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The objective of the report is to summarize current efforts pertaining to probabilistic analysis of composite structures, describe the Northrop Grumman Commercial Aircraft Division (NGCAD) composite probabilistic analysis methodology, show an example application using the NGCAD approach, and list the type and frequency of typical operations damage to composite components. The following sections of the report contain a review of three unique industry composite structural probabilistic design methods, an overview and example application (Lear Fan 2100 wing) of the NGCAD methodology, and a summary of maintenance information (operational damage) obtained from visits to commercial airline and military composite repair facilities.

NTIS

Commercial Aircraft; Composite Materials; Composite Structures; Grumman Aircraft; Northrop Aircraft; Structural Analysis; Structural Design; Wings

06
AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

19980012661

Perception of flight information from EFIS displays

Hosman, R. J. A. W., Delft Univ. of Technology, Netherlands; Mulder, M.; Control Engineering Practice; March, 1997; ISSN 0967-0661; Volume 5, no. 3, pp. 383-390; In English; Copyright; Avail: Issuing Activity

A pilot's perception of variables presented on the Electronic Flight Instrument System, EFIS, was investigated. A stimulus response technique was used to determine the accuracy and speed of the perception process. by varying the exposure time of the stimuli, it is shown that the perception of a variable's magnitude is faster and more accurate than the perception of the fast derivative or rate of that variable. Results of experiments on roll and pitch attitude perception, the influence of scale division, and the perception of the indicated airspeed, are shown.

Author (EI)

Display Devices; Flight Instruments; Avionics; Human-Computer Interface; Man Machine Systems; Human Factors Engineering

19980015435 Newcastle-upon-Tyne Univ., Dept. of Computing Science, Newcastle, UK

Information Structures for Traceability for Dependable Avionic Systems

Pearson, S., Newcastle-upon-Tyne Univ., UK; Saeed, A., Newcastle-upon-Tyne Univ., UK; Jan. 1997; 28p; In English

Report No.(s): PB97-140958; TRS-567; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this paper, we present a traceability procedure applicable to the development of dependable avionic systems. The procedure was developed by customizing a set of generic information structures that support the recording and manipulation of design rationale. The customization process was directed by an exposition of development practices for dependable avionic systems, in terms of a set of complementary models of a development context. to examine the effectiveness of the procedure and guide further work, a case study based on a high-integrity flight control subsystem is employed.

NTIS

Avionics; Control Systems Design; Controllers; Flight Control

19980016583 Sextant Avionique, Velizy-Villacoublay, France

Impact of New Information Technology and Micro-Techniques on Avionics Functions and Structures

Loise, Dominique, Sextant Avionique, France; Lacroix, Jean-Paul, Thomson-CSF, France; Future Aerospace Technology in the Service of the Alliance; Dec. 1997; Volume 2; 6p; In English; Also announced as 19980016571; Copyright Waived; Avail: CASI; A02, Hardcopy; A02, Microfiche

The avionics functions of the 70s and 80s had a growth rate of their embedded processing resources consistent with the progress pace of the semiconductors technology. The avionics functions designed in the early 90's were impacted by information technology, LCC and availability requirements; they are enlightened by the shift from federated to integrated avionics architectures. The micro-techniques, which allow to combine analog sensing and/or actuating with local processing and communication resources, combined to the new trends of information technology in networks (client/server architectures), and the steady increase of semi-conductors technology, may initiate the move of the integrated avionics functions to the distributed micro-systems. These

micro-techniques and their application fields are briefly described and their impacts on the architecture and functions are estimated. Some results come from advanced development of the Radar of the next generation, based on Active Array Antenna. Preliminary conclusions are that commercial technology (COTS, Software tools, digital processing, communication protocols) will be usable; an aggregated increase of the communication requirements has to be expected from the distribution of the sensors all over the platform but placing the boundaries at the wrong place while distributing the system may actually worsen the communication issues, as some management and fusion/ consolidation processing resources will have to remain centralized, notwithstanding potential exchanges between the distributed elements. These communication constraints, together with the cooling and power supply distribution issues, remain challenges that the avionics community would have to solve by itself.
Author
Information Systems; Avionics; Technology Assessment; Microinstrumentation; Semiconductor Devices; Aircraft Instruments; Radar Detection

07
AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

19980015500
Refractory metal-intermetallic in-situ composites for aircraft engines
Bewlay, B. P.; Lewandowksi, J. J.; Jackson, M. R.; JOM; August, 1997; ISSN 1047-4838; Volume 49, no. 8, pp. 44-45, 67; In English; Copyright; Avail: Issuing Activity

There has been substantial progress in the development of properties in high-temperature in-situ composites during the last five years. For example, fracture-toughness values in excess of 20 MPa square root of m have been reported in silicide-based composites toughened by niobium-based metallic solid solutions. These composites also have oxidation resistances and rupture lives comparable to those of single-crystal superalloys for temperatures up to 1,150 C. In this article, fracture toughness, oxidation characteristics, high-temperature mechanical behavior, and low-temperature fatigue properties of refractory metal-intermetallic composites (RMICs) are described and compared to aircraft-engine fundamental material property goals for the next millennium. Further avenues toward the pursuit of these goals are outlined.
Author (EI)
Aircraft Engines; Refractory Metals; Metal Matrix Composites; Intermetallics; Aircraft Construction Materials

19980015644 Illinois Inst. of Tech., Dept. of Mechanics Mechanical and Aerospace Engineering, Chicago, IL USA
Active Control of Supersonic Jet Screech Using MEMS ***Final Report, 15 Jun. 1996 - 14 Jun. 1997***
Naguib, Ahmed, Illinois Inst. of Tech., USA; Nagib, Hassan, Illinois Inst. of Tech., USA; Alnajjar, Emad, Illinois Inst. of Tech., USA; Christophorou, C., Illinois Inst. of Tech., USA; Najafi, Khalil, Illinois Inst. of Tech., USA; Sep. 1997; 8p; In English
Contract(s)/Grant(s): F49620-96-I-0293
Report No.(s): AD-A330573; AFOSR-97-0517TR; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The primary objective of this research is to investigate the usability of mechanical actuators, manufactured using MEMS technology, in the control of high-speed, compressible free shear flows. Appropriate development of MEMS-based actuators for flow control applications must address two issues: (1) the ability of the micron-size amplitude and forces of the MEMS devices to affect larger-scale flows with orders of magnitude higher energy, and (2) the survivability of the fairly fragile actuators when they are exposed to the flow in which they are embedded. Therefore, the current investigation is aimed at testing MEMS actuators for the purpose of controlling supersonic jet screech. For this application, the high-speed, highly-unsteady nature of the flow during screech provides a reasonably harsh environment for testing the survivability of the actuators. Furthermore, the shear layer surrounding the jet at its exit is known to be highly unstable to minute disturbances in the vicinity of the lip of the jet, and hence it is anticipated that the micron-size disturbances introduced by the MEMS actuators will be amplified through the shear layer instability mechanisms to produce large scale effects on the jet itself.
DTIC
Shear Flow; Shear Layers; Sound Waves; Supersonic Jet Flow; Unsteady Flow

19980016714 Boeing Commercial Airplane Co., Seattle, WA USA

Engine Case Externals Challenges and Opportunities

Miller, Mike, Boeing Commercial Airplane Co., USA; Seals/Secondary Flows Workshop 1996; Oct. 1997; Volume 2, pp. 477-500; In English; Also announced as 19980016712; Original contains color illustrations; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44135), Hardcopy, Microfiche

The paper discusses opportunities and challenges as they apply to engine externals in general and cowling seals, component cooling, fire extinguishing and 700 deg wiring in particular. The conclusions reached from the discussion are that the research community needs to review the opportunities for improvements outside the engine case. Airframers are meeting the challenges with expensive test and development programs and analysis capability improvement will benefit the industry.

CASI

Cowlings; Fire Extinguishers; Wiring; Seals (Stoppers); Leakage; Air Cooling; Engine Parts

19980016716 NASA Lewis Research Center, Cleveland, OH USA

Numerical Propulsion System Simulation

Veres, Joseph P., NASA Lewis Research Center, USA; Seals/Secondary Flows Workshop 1996; Oct. 1997; Volume 2, pp. 539-554; In English; Also announced as 19980016712; Original contains color illustrations; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44135), Hardcopy, Microfiche

The goal of NPSS is to provide a detailed system simulation for use by engine manufacturers to accurately predict performance early during design. Computer simulations are a primary tool used in the design of new turbine engines. A high fidelity system model can quantify the performance of each engine component and its interactions with other components in a system environment. The improved predictive capability introduced into the design process can reduce the number of design and test iterations in an engine development program, and result in lowering the acquisition cost of engines. Improved performance predictive capability can also benefit the engine system by properly matching components at their peak efficiencies, which in turn can reduce the specific fuel consumption and engine operating costs. The approach used in the development of NPSS is to combine existing validated computer models for fluid mechanics, heat transfer, combustion, structural mechanics and other disciplines into one large system of codes. The NPSS architecture is designed to run the various disciplinary codes in a common simulation environment. The computationally intensive multidisciplinary simulations are to be run on high performance parallel computing platforms to enable rapid affordable computations of engine aerodynamic performance and operability. NPSS is also sometimes referred to as a ”Numerical Test Cell for Aerospace Propulsion Systems”.

Derived from text

Engine Design; Systems Simulation; Computer Aided Design; Computerized Simulation; Gas Turbine Engines; Jet Propulsion; Multidisciplinary Design Optimization

19980016717 NASA Lewis Research Center, Cleveland, OH USA

Effects of Shrouded Stator Inner-Band Cavity Flows on Multistage Axial-Flow Compressor Performance

Strazisar, Tony, Editor, NASA Lewis Research Center, USA; Seals/Secondary Flows Workshop 1996; Oct. 1997; Volume 2, pp. 555-588; In English; Also announced as 19980016712; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44135), Hardcopy, Microfiche

The focus of the work was to investigate the effects that shrouded compressor stator seal cavity flows have on power stream performance, as opposed to studying the details of the cavity flow itself. The work was performed in the NASA Lewis Low Speed Axial Compressor (LSAC) facility, which is patterned after a low speed facility used by GE Aircraft Engines. Our low speed facility uses the blading design developed by GE under the NASA E3 program. The blading is representative of the rear stages of a multistage machine, so we have relatively high hub-tip radius ratio, low aspect ratio blading. The test compressor is a four stage machine with an IGV. The stators have representative seal cavities representative of high-pressure compressor rear stages with a single seal tooth mounted on the rotor drum. The tip diameter is 48 inches, the hub diameter is 38.4 inches, and the tip speed is about 200 feet per second. Several cavity configurations were investigated along with a variation in the seal tooth clearance itself. These configurations are shown in third figure, where t is the seal clearance in inches and t/h is the seal clearance normalized by blade span. The baseline configuration consists of a single seal tooth on the rotor drum under the stator foot ring. The seal tooth clearance for this cavity configuration was varied by adding a shim under the seal tooth. Three levels of seal tooth clearance (0.67% span, 1.35% span, 2.02% span) were investigated in this manner, with the same clearance set up under each of the four stator rows. Two additional cases were investigated - one with nearly zero seal tooth clearance and one without footring cavities.

Derived from text

Cavity Flow; Stators; Tip Speed; Turbocompressors; Compressor Blades; Seals (Stoppers); Shrouded Turbines; Gas Turbine Engines; Leakage

19980016721 NASA Lewis Research Center, Cleveland, OH USA

Engine Structures Computational Simulation Methods

Chamis, Christos C., NASA Lewis Research Center, USA; Seals/Secondary Flows Workshop 1996; Oct. 1997; Volume 2, pp. 649-672; In English; Also announced as 19980016712; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44135), Hardcopy, Microfiche

Select computer codes developed over the years to simulate specific aspects of engine structures are described with typical results to illustrate their capability. These codes include blade impact integrated multidisciplinary analysis and optimization, progressive structural fracture, quantification of uncertainties for structural reliability and risk, benefits estimation of new technology insertion and hierarchical simulation of engine structures made from metal matrix and ceramic matrix composites. Collectively these codes constitute a unique infrastructure readiness to credibly evaluate new and future engine structural concepts throughout the development cycle from initial concept, to design and fabrication, to service performance and maintenance and repairs, and to retirement for cause and even to possible recycling. Stated differently, they provide ”virtual” concurrent engineering for engine structures total-life-cycle-cost.

Author

Concurrent Engineering; Engine Design; Life Cycle Costs; Applications Programs (Computers); Error Detection Codes; Multidisciplinary Design Optimization; Computerized Simulation; Engine Parts

08
AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

19980012557 Technische Univ., Delft, Netherlands

Investigation of the Total Energy Control System (TECS) Elevator Innerloop

Tump, R. S., Technische Univ., Netherlands; Mulder, J. A., Technische Univ., Netherlands; Aug. 1996; 173p; In English; Figures in this document may not be legible in mic

Report No.(s): PB97-204523; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

The Total Energy Control System (TECS) is a Multi-Input-Multi-Output (MIMO) aircraft control strategy for the longitudinal motion. TECS consists of two parts. An airplane independent part (named TECS outerloops) and an airplane dependent part (named TECS innerloops). First, the Linear Quadratic Regulatory (LQR) method is applied to the design of the elevator innerloop. LQR is a modern design method. Secondly, different elevator innerloops have been investigated, in which the pitch attitude signal is not used. In the last part of the TECS controller is compared with a conventional autopilot - autothrottle controller. A study of literature has been carried out to become familiar with the latest developments on the subject. The designs and performance comparisons are carried out using MATLAB/Simulink. It is concluded that using the LQR method does not give advantages over classical design methods for designing the TECS elevator innerloop. In general, TECS surpasses conventional feedback controllers in performance.

NTIS

Control Systems Design; Aircraft Control; Linear Quadratic Regulator; Examination; Total Energy Systems; MIMO (Control Systems)

19980012558 Technische Univ., Delft, Netherlands

Feasibility Study on the Implementation of a Given Hydraulic Servo Actuator in the Cessna Citation 2 Elevator Flight Control System

Brozius, B. R. F., Technische Univ., Netherlands; Mulder, J. A., Technische Univ., Netherlands; Aug. 1996; 188p; In English; Figures in this document may not be legible in mic

Report No.(s): PB97-204515; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

This report contains the results of a feasibility study on the implementation of a given hydraulic servoactuator in parallel with conventional Elevator Flight Control System (EFCS) of the Cessna Citation 2. For this purpose, a nonlinear elevator model and servoactuator model is derived. First, the performance diagram for sinusoidally movement of the elevator control surface with a simplified elevator model is presented. Thereafter, dynamic analysis of the two integrated models follows. An autopilot is designed to verify the servoactuator controller design for representative control tasks and responses on turbulence. For the

aircraft model, the similar Cessna Citation 500 was used. Simulations were done with the use of the software package DASMAT.
NTIS
Servomechanisms; Aircraft Control; Elevators (Control Surfaces); Feasibility Analysis; Flight Control; Actuators; Hydraulic Equipment

19980015422 Technische Univ., Faculty of Aerospace Engineering, Delft, Netherlands
Cessna Citation 2 Flight Tests: Engine Modeling, Aerodynamic Model Identification and Software Development
Sridhar, J. K., Technische Univ., Netherlands; Fritschy, J., Technische Univ., Netherlands; Hulshoff, S., Technische Univ., Netherlands; Mulder, J. A., Technische Univ., Netherlands; Jun. 1997; 205p; In English
Report No.(s): PB97-204697; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

This disciplinary group of Stability and control of the Faculty of Aerospace Engineering of the Technical University in Delft is active in a big variety of research fields, for example the development of a Fly-by-wire Testbed and the design of a flight simulator (SIMONA). In March 1993, the Faculty of Aerospace Engineering (TUD/LR) together with the National Aerospace Laboratory (NLR) purchased a Cessna Citation 2. This twin-jet aircraft has more or less the same flight envelope (speeds, flight altitudes) as compared to that of the big airliners, like the Boeing 757. Within the disciplinary group of Stability and Control, there was demand for accurate flight test data of the TUD/NLR Cessna Citation 2 Laboratory aircraft. Flight tests were to be performed to provide an accurate unsteady aerodynamic model of the aircraft (for SIMONA), and to provide force and trajectory information for the validation of a Computational Fluid Dynamics (CFD) methods, currently under development.
NTIS
Flight Tests; Unsteady Aerodynamics; Aircraft Models; Cessna Aircraft; Mathematical Models; Aircraft Maneuvers; Flight Control; Aircraft Control

19980015423 Technische Univ., Delft, Netherlands
Experimental Validation of the Handling Qualities Demonstrator
Bakkum, G. J. P., Technische Univ., Netherlands; Mulder, M., Technische Univ., Netherlands; Mulder, J. A., Technische Univ., Netherlands; Jul. 1996; 142p; In English
Report No.(s): PB97-204663; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This report discusses an experiment with the HQD, in which three evaluation pilots were subjected to a pitch angle tracking task for three different configurations of handling qualities. The goal of the experiment was to provide an experimental validation of the HQD software package. In Chapter 2 of this report a brief overview is presented on pilot control behavior in closed-loop control tasks. The next chapter serves as an introduction to the assessment of handling qualities. A short description of the HQD for longitudinal motion is given in Chapter 4. In Chapter 5, the tracking experiment is discussed. A pre-experimental analysis of handling qualities, control behavior, and performance is the subject of Chapter 6. Results of the experiment are treated in Chapter 7. Finally, Chapter 8 gives a discussion of these results, followed by conclusions and recommendations. The graduation assignment that led to this report is included in Appendix E.
NTIS
Applications Programs (Computers); Program Verification (Computers); Pitch (Inclination); Controllability; Aircraft Control; Feedback Control; Flight Control; Tracking (Position)

19980016836 University of Southern California, Dept.of Aerospace Engineering, Los Angeles, CA USA
Aerodynamic Flow vectoring of Wakes and Jets for High Lift Control ***Final Report, 15 Jun. 1994 - 14 Jun. 1997***
Redekopp, Larry G., University of Southern California, USA; Sep. 1997; 53p; In English
Contract(s)/Grant(s): F49620-94-J-0358
Report No.(s): AD-A330588; AFOSR-97-0533TR; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A methodology has been developed for the aerodynamic flow-vectoring control of wakes on jets. Directional flow control of wakes and jets has been demonstrated without requiring any mechanical motion of the boundaries which constraint or guide the flow. The methodology is based on global instability concepts. The key to the success of this approach is to use local suction to suppress any global instability and then exploit symmetry considerations to produce proportional directional control of this flow.
DTIC
Jet Aircraft; Aerodynamic Characteristics; Directional Control; Thrust Vector Control

09
RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

19980014054
Toward an independent and internationally open research institute
Wako, Kanji, Railway Technical Research Inst.; Japanese Railway Engineering; July, 1997; ISSN 0448-8938, no. 138, pp. 23; In English; Copyright; Avail: Issuing Activity

The Railway Technical Research Institute of Japan has established itself as an independent, reliable body open to international exchange of information. Its efforts in research and development of MAGLEV is so advanced that they are searching to verify the feasibility of the commercial operation of MAGLEV train at 500 km/h with an elaborate program of tests aimed at superspeed. In 1996, the Railway Technology Promotion Center was organized to cover private railways and various manufacturers. In April of the same year, a large-scale wind tunnel was built and began to operate as a powerful tool to cope with noise and other aerodynamic problems associated with Shinkansen.
EI
Rail Transportation; Information Systems; Research Facilities; Research and Development; Research Management; Wind Tunnels

19980015152 General Accounting Office, Resources, Community and Economic Development Div., Washington, DC USA
Report to the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives. Airport Privatization: Issues Related to the Sale or Lease of US Commercial Airports
Nov. 1996; 58p; In English
Report No.(s): PB97-210355; GAO/RCED-97-3; B-271960; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The possible sale or lease of commercial airports in the USA to private companies has generated considerable attention in recent years. Such cities as New York and Los Angeles have considered privatizing their airports. proponents claim that privatization would inject much needed capital into the aviation infrastructure because it would make airports more commercially oriented and financially self-sufficient. Opponents say that local governments favor privatization as a way to divert airport revenue intended for developing aviation infrastructure to other municipal purposes, resulting in increased costs for airlines and passengers. The Chairman and Ranking Minority Member of the Subcommittee on Aviation, House Committee on Transportation and Infrastructure, requested that GAO examine (1) the current extent of private sector participation at commercial airports in the USA and foreign countries; (2) the current incentives and barriers to the sale or lease of airports; and (3) the potential implications for major stakeholders, such as the passengers, airlines, and local, state, and federal governments, should airports be sold or leased. This report expands on testimony provided to the Subcommittee in February 1966.
NTIS
Airline Operations; Airports; Civil Aviation; Commercial Aircraft; Congressional Reports; Transportation; USA

19980015154 NERAC, Inc., Tolland, CT USA
Supersonic Wind Tunnels (Latest Citations from the Aerospace Database)
Feb. 1996; In English; Page count unavailable
Report No.(s): PB96-863154; NASA/TM-96-206788; NAS 1.26:206788; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, construction, operation, performance, and use of supersonic wind tunnels. References cover the design of flow nozzles, diffusers, test sections, and ejectors for tunnels driven by compressed air, high-pressure gases, or cryogenic liquids. Methods for flow calibration, boundary layer control, local and freestream turbulence reduction, and force measurement are discussed. Instrusive and non-intrusive instrumentation, sources of measurement error, and measurement corrections are also covered. The citations also include the testing of inlets, nozzles, airfoils, and other components of aerospace vehicles that must operate supersonically. Comprehensive coverage of wind tunnel force balancing systems, and blowdown and supersonic wind tunnels are covered in separate bibliographies.(Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Supersonic Wind Tunnels

19980015179 National Inst. of Standards and Technology, National Voluntary Lab. Accreditation Program, Gaithersburg, MD USA

National Voluntary Laboratory Accreditation Program 1996 Directory

White, V. R., National Inst. of Standards and Technology, USA; Jan. 1996; 193p; In English

Report No.(s): PB96-162714; NIST/SP-810-ED-1996; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The Directory is published annually and provides a listing of laboratories accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP). Approximately 700 laboratories in 19 fields of accreditation are included in the 1996 edition. The Directory lists the name, address, contact person, phone and fax numbers, accreditation renewal date, and scope of accreditation of each accredited laboratory. The Directory contains a description of the NVLAP program, a summary of laboratory participation, and user instructions, followed by five laboratory indexes which are cross-referenced by NVLAP Lab Code: Index A. Listing by Laboratory Name; Index B, Listing by Field of Accreditation; Index C, Listing by State/ Country; Index D. Listing of Testing Laboratories by NVLAP Lab Code; Index E, Listing of Calibration Laboratories by NVLAP Lab Code. The Scopes of Accreditation are provided for testing and calibration laboratories in Indexes D and E, respectively. Current accreditation statuses of participating laboratories may be verified by calling or writing NVLAP.

NTIS

Laboratories; Directories; Standards

19980016143 NERAC, Inc., Tolland, CT USA

Simulators in Training. (Latest Citations from the NTIS Bibliographic Database)

Feb. 1996; In English; Page count unavailable.

Report No.(s): PB96-863808; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning research on simulators and simulator technology in a broad range of training settings. Military settings are stressed. Aerial, ground, marine, and submarine operations are investigated. Simulators that allow students to perfect procedures are described, emphasizing training for firefighting, sonar, radar, spacecraft, and sea navigation.(Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Bibliographies; Simulators; Computerized Simulation

11
CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; propellants and fuels; and materials processing.

19980012946

Procedure for calculating an intensity of the wearing of friction couples in compressor of chemical equipment

Kalashnikov, V. F.; Khimicheskoe I Neftyanoe Mashinostroenie; May-June, 1997; ISSN 0023-1126, no. 3, pp. 46-47; In Russian; Copyright; Avail: Issuing Activity

An analysis of compressor permissible wear under operation conditions is carried out as applied to boundary and liquid operation conditions of friction couples. The friction couple of sliding bearing type is considered. The relations for determining the contact angle of friction couple are given. The contact between ideally smooth and rough surfaces is the basis of calculated procedure. The obtained relations are valid in all cases of unsteady regime of compressor operation or liquid lubricant violation in steady one.

EI

Friction Factor; Wear; Friction; Bearings; Compressors

19980013916

Effect of anisotropy of rotor steel properties on external magnetic fields of electric machines

Volokhov, S. A., IED AN Ukrainy, Ukraine; Dobrodeev, P. N.; Elektrotekhnika; July, 1997; ISSN 0013-5860, no. 7, pp. 39-43; In Russian; Copyright; Avail: Issuing Activity

The effect of the anisotropy of the rotor steel on external magnetic fields of electric machines has been investigated. The analysis of the current value of the magnetic induction in the electric machine gap has shown that the presence of the anisotropy of

the rotor steel has resulted in the appearance in the gap of the magnetic induction time harmonics spectrum with the multiplicity higher and lower the fundamental harmonic. This has led to the appearance in the external magnetic field of an electric machine the spatial harmonics of different frequency. The greatest effect of the rotor steel anisotropy has manifested on the level of the external field of six-pole electric machines.
EI
Magnetic Fields; Magnetic Induction; Steels; Magnetic Materials; Electromechanical Devices; Rotors

19980013930 Virginia Univ., School of Engineering and Applied Science, Charlottesville, VA USA
NASA-UVa Light Aerospace Alloy and Structure Technology Program Supplement: Aluminum-Based Materials for High Speed Aircraft ***Final Report, 1 Jan. 1992 - 31 Oct. 1995***
Starke, E. A., Jr., Virginia Univ., USA; Dec. 1997; 572p; In English
Contract(s)/Grant(s): NAG1-745; RTOP 537-06-31-20
Report No.(s): NASA/CR-1997-206248; NAS 1.26:206248; UVA/528266/MSE96/120; No Copyright; Avail: CASI; A24, Hardcopy; A04, Microfiche

This is the final report of the study "Aluminum-Based Materials for High Speed Aircraft" which had the objectives (1) to identify the most promising aluminum-based materials with respect to major structural use on the HSCT and to further develop those materials and (2) to assess the materials through detailed trade and evaluation studies with respect to their structural efficiency on the HSCT. The research team consisted of ALCOA, Allied-Signal, Boeing, McDonnell Douglas, Reynolds Metals and the University of Virginia. Four classes of aluminum alloys were investigated: (1) I/M 2XXX containing Li and I/M 2XXX without Li, (2) I/M 6XXX, (3) two P/M 2XXX alloys, and (4) two different aluminum-based metal matrix composites (MMC). The I/M alloys were targeted for a Mach 2.0 aircraft and the P/M and MMC alloys were targeted for a Mach 2.4 aircraft. Design studies were conducted using several different concepts including skin/stiffener (baseline), honeycomb sandwich, integrally stiffened and hybrid adaptations (conventionally stiffened thin-sandwich skins). Alloy development included fundamental studies of coarsening behavior, the effect of stress on nucleation and growth of precipitates, and fracture toughness as a function of temperature were an integral part of this program. The details of all phases of the research are described in this final report.
Author
Aircraft Structures; Aluminum Alloys; Metal Matrix Composites; Composite Structures; Civil Aviation

19980013938 Naval Surface Warfare Center, Annapolis, MD USA
Corrosion Consequences of Molten Salt Deposits in Combustion Turbines Burning Vanadium Contaminated Liquid Fuel
Rathnamma, Dasara V., Naval Surface Warfare Center, USA; Nagarajan, R., International Business Machines Corp., USA; Jun. 1994; 36p; In English; Tri-Service Conference on Corrosion Proceedings, 21-23 Jun. 1994, Orlando, FL, USA
Report No.(s): AD-A330947; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Molten salts condensing on marine turbine blades can dissolve the protective oxide coating and catastrophically attack the exposed alloy surface beneath-- a process known as hot corrosion. We present here the implications of a theoretical model of hot corrosion rate that is limited by diffusional dissolution of oxide species into the melt for the design of burner-rigs to test the corrosion-resistance of superalloy materials. Parameters expected to govern the dissolution rate of a given oxide are the rate of deposition of the multicomponent(sulfate-vanadate-oxide)'solvent'- liquid, liquid-layer thickness, and composition-dependent physical properties of the deposit, such as density and viscosity. The solid portion of deposit mass, being relatively inert with respect to hot corrosion, will not correlate well with experimental corrosion rates. These hypotheses are tested by comparing our model-predictions with one set of burner-rig corrosion rate measurements made during the combustion of vanadium-containing liquid fuel seeded with the same concentration of various metallic additives. Our findings indicate that the total weight (solids + liquid) of the deposit has no direct correspondence with its corrosive potential. However, additives that are effective in suppressing liquid phase formation will, in general, reduce the corrosion rate equally effectively. Liquid mass arrival rate and oxide solubility in the liquid are quantities of relevance to the problem, but the best correlation of experimental data with theory is obtained for the oxide dissolution rate (which is approximately inversely proportional to the liquid layer thickness). Thus, burner-rigs designed to simulate either of these two parameters will reproduce the hot-corrosion characteristics of the engine with reasonable accuracy.
DTIC
Burners; Combustion; Condensing; Contamination; Corrosion; Corrosion Resistance; Data Correlation; Gas Turbine Engines; Heat Resistant Alloys; Hot Corrosion; Hypotheses

19980014812 Naval Air Warfare Center, Aircraft Div., Warminster, PA USA

Tri-Service Committee on Corrosion

Pulley, David, Naval Air Warfare Center, USA; Jun. 1994; 8p; Proceedings: Revision of Navy Paint Specifications, 21-23 Jun. 1994, Orlando, FL, USA

Report No.(s): AD-A330966; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The Navy maintains a number of specifications for the organic coatings applied to aircraft and ground support equipment. These documents are periodically revised and amended to include lessons learned from qualification testing, improvements in the state-of- the-art, and new regulatory requirements. To accomplish these objectives, we will revise ten different specifications by the end of this year. They include: wash primer alkyd primer, epoxy primers, polyurethane primer, acrylic lacquer, temporary, acrylic lacquer, epoxy topcoat, polyurethane topcoat, polyurethane, rain-erosion coating. All of these specifications (including every type and class) will comply with air-pollution regulations that limit the Volatile Organic Compounds (VOC) content. This will be accomplished using water-borne or high-solids coatings technology. The maximum VOC Content will generally be sit at 340 grams/liter for primers and 340-420 grams/liter for other coatings. The use of 1,1,1-trichioroethane (exempt from VOC regulations) will no longer be permitted due to its classification as an ozone-depleting substance.

DTIC

Organic Compounds; Protective Coatings; Organic Materials; Polyurethane Resins; Aircraft Design; Paints

19980015888

Analysis of creep damage in a welded low alloy steel rotor

Indacochea, J. E., Univ. of Illinois at Chicago, USA; Seshadri, R. A.; Materials Science & Engineering A: Structural Materials: Properties, Microstructure and Processing; August 30, 1997; ISSN 0921-5093; Volume A234-23, pp. 555-558; In English; 1997 11th International Conference on the Strength of Materials, Aug. 25-29, 1997, Prague, Czech Republic; Copyright; Avail: Issuing Activity

An assessment of commonly used creep-rupture extrapolation techniques on weldments was undertaken. Gas tungsten arc and submerged arc welds were fabricated using 1.0Cr-1Mo-0.25 V rotor steel as base metal. Crossweld samples, which includes base metal, heat-affected zone and weld metal, were machined and submitted to isostress creep-rupture tests at 83.0 MPa between 690 and 620 C. Larson-Miller and Monkman-Grant plots were produced from these data; the parameters associated with the Larson-Miller method were estimated and extrapolations were done to the service temperatures. The actual lives of the submerged arc crosswelds were shorter than predicted. Monkman-Grant predictions were more conservative than Larson-Miller's for the gas tungsten arc welds. The discrepancies are attributed in part to the heterogeneous microstructures in a crossweldment leading to different creep rates. Application of extrapolation methods to weldments should be done prudently; the heterogeneous microstructure of the heat-affected zone makes them less reliable.

Author (EI)

Creep Properties; Gas Tungsten Arc Welding; High Strength Steels; Welded Joints; Arc Welding; Marine Environments; Stainless Steels; Rotors; Heat Affected Zone

19980012781

Quiet boost

Cvjeticanin, N.; Wolf, A.; Spitznagel, F.; Kunststoffe Plast Europe; June, 1997; ISSN 0945-0084; Volume 87, no. 6, pp. 18-20; In English; Copyright; Avail: Issuing Activity

Low noise level is a primary requirement in new automotive developments. Boost air silencers reduce the unpleasant frequencies of supercharger noise. In a joint development between the initial developer, the raw material producer and the automotive manufacturer, a new development made from heat-resistant, reinforced polyamide is now ready for full-scale production.

Author (EI)

Polyamide Resins; Silencers; Superchargers; High Temperature; Thermal Resistance

19980014525 NERAC, Inc., Tolland, CT USA

Ceramics Technology: Automotive Gas Turbine Engine Component Applications. (Latest citations from the NTIS Bibliographic Database)

Apr. 1996; In English; Page count unavailable.

Report No.(s): PB96-868161; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the technological development of ceramic materials for use in design and manufacture of gas turbine engine components. Citations discuss the fabrication of ignition system components, combustion

chamber parts, gas-path seals, rotors, stators, nozzles, blades, and heat exchangers. Ceramic metal composites for engine components are also examined. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Automobile Engines; Ceramics; Engine Parts; Bibliographies; Gas Turbine Engines

19980016638 NERAC, Inc., Tolland, CT USA
Ceramics Technology: Automotive Gas Turbine Engine Component Applications (Latest Citations from the Energy Science and Technology Database)
Apr. 1996; In English; Page count unavailable
Report No.(s): PB96-869136; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and evaluation of ceramic materials for use in automotive gas turbine components. Citations discuss the design, fabrication, and testing of rotary regenerators, turbine rotors, blades, stators, combustion chambers, heat exchangers, nozzles, and seals. References to high-strength ceramic materials, thermodynamic properties, thermal efficiency, and environmental effects are included.
NTIS
Ceramics; Combustion Chambers; Energy Technology; Environment Effects; Gas Turbine Engines; Heat Exchangers; Regenerators; Research and Development; Thermodynamic Efficiency

19980012668
Design of free product recovery system for jet fuel
Reis, Richard S., Fluor Daniel GT1, USA; Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management; October, 1997; ISSN 1090-025X; Volume 1, no. 4, pp. 151-153; In English; Copyright; Avail: Issuing Activity

The U.S. Navy has operated a military installation at Adak Island, Ala., since 1943. Jet fuel (JP-5) has been used as the primary fuel source on the island, including use as heating oil in the housing areas. Releases of JP-5 to the subsurface were discovered in three housing areas in 1988, and a product recovery system was installed in 1989. The original product recovery system consisted of 17 recovery wells with dual-phase pumps. Recovered product was pumped into storage tanks for recycling on Adak. Recovered water was discharged to the sanitary sewer. The volume of product recovered by the system had declined steadily since installation. In 1993, the Navy decided to investigate and evaluate the operational status and effectiveness of the existing recovery systems. This investigation determined that the product recovery systems were not operating as designed and that some of the plumes had migrated further beyond the effective zone of capture of the existing recovery wells. Several alternative recovery system designs were identified that would effectively remediate the jet fuel product plumes while minimizing ongoing maintenance requirements.
Author (EI)
Jet Engine Fuels; Aircraft Fuels; Waste Utilization; Plumes; Wells

19980014459 Southwest Research Inst., San Antonio, TX USA
Biodiesel Fuel Technology for Military Application ***Interim Report, Jul. 1994 - May 1996***
Frame, Edwin A., Southwest Research Inst., USA; Bessee, Gary B., Southwest Research Inst., USA; Marbach, Howard W., Jr, Southwest Research Inst., USA; Dec. 1997; 308p; In English
Contract(s)/Grant(s): DAAK70-92-C-0059
Report No.(s): AD-A332922; TFLRF-317; No Copyright; Avail: CASI; A14, Hardcopy; A03, Microfiche

This program addressed the effects of biodiesel (methyl soyate) and blends of biodiesel with petrofuels on fuel system component and material compatibility, fuel storage stability, and fuel lubricity. Biodiesel was found to have excellent lubricity properties and was effective at 1 volume percent (vol %) blend in improving the lubricity of Jet A-1 fuel. The following potential problem areas associated with methyl soyate use were identified: storage stability, compatibility with some metals, and compatibility with nitrile elastomers.
DTIC
Methyl Compounds; Jet Engine Fuels; Fuel Systems

12
ENGINEERING

Includes engineering (general); communications and radar; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.

19980012710 Olin Aerospace Co., Redmond, WA USA

Advanced Fire Suppression Technology (AFST) Research and Development Program ***Final Report, 31 Aug. 1993 - 28 Apr. 1997***

Wilson, M. A., Olin Aerospace Co., USA; Moran, J. D., Olin Aerospace Co., USA; Apr. 1997; 33p; In English

Contract(s)/Grant(s): F33615-93-C-3404; AF Proj. 2402

Report No.(s): AD-A329985; WL-TR-97-3092; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Halon 1301 has been widely used in aircraft fire suppression systems because of its ability to efficiently extinguish fires. Unfortunately, halon production was banned in 1994 because it is an ozone depleting substance. The ban on halon production has created a need for alternative fire suppression technologies in both the military and civilian aircraft industries. Solid Propellant Gas Generators (SPGG) is a viable alternative to halon for in-flight fire suppression. SPGG relies on the controlled burning of solid reactants to produce inert gases (H2O, CO2, and N2) that can be used for fire suppression and it was developed from technology originally applied in automotive airbag devices. The testing discussed in this report is based on the results and conclusions derived from previous testing. SPGG devices and hybrid systems (SPGG used to pressurize a liquid fire extinguishant such as H2O or FM200) were tested against three fire conditions. The test results revealed that SPGG and hybrid systems were effective in extinguishing the fire conditions, but performance was slightly worse than HFC-125 on an agent mass comparison. Further testing and development of the gas generator is required before it is fully understood and can be considered mature.

DTIC

Fire Extinguishers; Research and Development; Solid Propellants; Gas Generators; Aircraft Industry

19980016761 Naval Postgraduate School, Monterey, CA USA

An Adaptive Inspection Sampling Program for Determining Coating Failure of Nimitz Class Aircraft Carrier Tanks and Voids

Thornell, Mark E., Naval Postgraduate School, USA; Mar. 1997; 164p; In English

Report No.(s): AD-A330943; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This thesis addresses Nimitz class aircraft carrier tank and void maintenance. It contributes to the solution of current maintenance problems in four ways. First, it stratifies Nimitz class aircraft carrier tanks and voids into ten groups and assigns a criticality factor to each group. These groups and criticality factors can be extended to other classes of ships. Second, it demonstrates methods to estimate the survival function of tank and void coating lifetimes based on inspection data. Actual estimates of the survival function for each group are given, but are based on current data of questionable quality. Third, it develops a decision tool to plan inspections and budget maintenance costs over multiyear periods. Preliminary application of this tool demonstrates the cost effectiveness of driving maintenance by inspection. Finally, sampling plans provided to AIRLANT for CVN 71 1997 EDSRA and CVN 73 1997 SRA are discussed. These sampling plans were developed to obtain unbiased estimates of the current proportion of failed tanks within each group. by using plans such as these, unbiased estimates of the survival function for each group can be computed. This thesis provides a framework for developing a long term inspection and maintenance program.

DTIC

Aircraft Carriers; Fuel Tanks; Protective Coatings; Inspection; Failure Analysis

19980013545

Asynchronous generator with guaranteed self-excitation

Bespalov, V. Ya.; Aliev, I. I.; Klokov, Yu. B.; Elektrichestvo; July, 1997; ISSN 0013-5380, no. 7, pp. 43-45; In Russian; Copyright; Avail: Issuing Activity

A novel design of the asynchronous generator with a squirrel-cage rotor is suggested. The small permanent magnet is mounted into the magnetic generator circuit that reliably provides the self-excitation process beginning regardless of the value of residual flux in the laminated magnetic circuit. Capacitors in the stator winding circuit are the main source of reactive power. Results of the permanent magnet field calculations and a mathematical model of the generator with autonomous load in the form of a system of ordinary differential equations are presented.

EI

Self Excitation; Synchronism; Rotors; Winding; Permanent Magnets; Magnetic Circuits; Mathematical Models

19980013546

Method for calculating the tooth pitch impedance of a squirrel-cage rotor with allowance for tooth saturation

Inkin, A. I.; Temlyakova, Z. S.; Elektrichestvo; July, 1997; ISSN 0013-5380, no. 7, pp. 37-42; In Russian; Copyright; Avail: Issuing Activity

A method is proposed for the calculation of the tooth pitch impedance of the squirrel-multicage rotor of an induction motor with allowance for tooth saturation. The method is based on the cascade equivalent circuit and electrodynamic equations. The method suggested is physically substantiated, easy-to-interpret and has high accuracy. Its practical application is preferable for engineering calculations of asynchronous machines.

EI

Induction Motors; Motors; Rotors; Winding; Electrical Resistance; Equivalent Circuits

19980013912

Electromagnetic processes in the asynchronous machines with alternating slots of the short-circuited rotor

Popov, V. I.; Makarov, L. N.; Martynov, V. A.; Elektrotekhnika; July, 1997; ISSN 0013-5860, no. 7, pp. 1-5; In Russian; Copyright; Avail: Issuing Activity

An improved design of the short-circuited rotor with alternating slots with different shapes, cross sections and scattering conductivities is suggested. The slot application improves simultaneously the start characteristics and raises energy characteristics of the operation regime of three-phase asynchronous machines (AM) of the moderate and large power as well as increase the limit machine parameters. The application of such the rotors allows to obtain AM in the complete and simultaneous use the start and operation slots with the optimal values of efficiency, power coefficient cos phi, start moment and current which exceed the same values of AM with usual design of the short-circuited rotor.

EI

Short Circuits; Induction Motors; Rotors; Winding; Magnetic Fields

19980016243

New approach for high-performance PMSM drives without rotational position sensors

Kim, Joohn-Sheok, Seoul Natl. Univ., Republic of Korea; Sul, Seung-Ki; IEEE Transactions on Power Electronics; September, 1997; ISSN 0885-8993; Volume 12, no. 5, pp. 904-911; In English; Copyright; Avail: Issuing Activity

A new approach to the position sensor elimination of the permanent magnet synchronous machine (PMSM) drives is presented in this paper. With the help of the modern drive technique, the actual rotor position as well as the machine speed can be estimated accurately even in the transient state using the 'electrical steady-state' operation concepts. Due to the angle-modification scheme with error-tracking function, the sensorless drive system has the robustness to the parameter variation. As well as giving a detailed explanation of the new algorithm, the paper presents a wide range of experimental results, demonstrating the feasibility of the proposed method under full operating conditions in +/- 50 to approximately +/- 2000 [rpm] speed range and 0 to approximately 1 per unit (p.u.) load condition.

Author (EI)

Mechanical Drives; Permanent Magnets; Rotors; Winding; Algorithms

19980016317

High aspect ratio contacts: A review of the current tungsten plug process

Ireland, P. J., Micron Technology, Inc., USA; Thin Solid Films; July 30, 1997; ISSN 0040-6090; Volume 304, no. 1-2, pp. 1-12; In English; Copyright; Avail: Issuing Activity

The key materials and processing parameters for successful high aspect ratio contacts (HARCs) in the tungsten plug process are highlighted. These include: 1) dopant levels; 2) cleans; 3) contact layer; 4) barrier layer; 5) Ti-TiN anneal; 6) tungsten fill; and 7) tungsten etchback. Detrimental contact-related defects are discussed with emphasis on their source. Means of depositing TiN are also presented, with their inherent advantages and disadvantages.

EI

High Aspect Ratio; Electric Contacts; Aspect Ratio; Additives; Semiconductors (Materials); Vapor Deposition; Titanium Nitrides

19980011214

Experimental investigation of hypervelocity flow in a conical nozzle

Mallinson, S. G., Imperial Coll. of Science, Technology and Medicine, UK; Gai, S. L.; Mudford, N. R.; Applied Scientific Research (The Hague); 1996/1997; ISSN 0003-6994; Volume 57, no. 1, pp. 81-93; In English; Copyright; Avail: Issuing Activity

The flow in a conical nozzle is examined experimentally for a range of hypervelocity conditions in a free-piston shock tunnel. The pitot pressure levels compare reasonably well with an inviscid numerical prediction which includes a correction for the growth of the nozzle wall boundary layer. The size of the nozzle wall boundary layer seems to be well predicted by semi-empirical expressions developed for perfect gas flows, as do data from other free-piston shock tunnels.

Author (EI)

Conical Nozzles; Hypervelocity Flow; Shock Tunnels; Hypersonic Flow; Wind Tunnels; Pressure Effects; Numerical Analysis

19980012051

Transition of separated shear layer from order to chaos

Dong, Y. F., Chinese Acad. of Sciences, China; Wei, Z. L.; Xu, C.; Physics of Fluids; September, 1997; ISSN 1070-6631; Volume 9, no. 9, pp. 2580-2584; In English; Copyright; Avail: Issuing Activity

The transition of the separated shear layer from order to chaos is investigated for the Reynolds numbers ranging from 2.4 x 10(sup 3) to 20 x 10(sup 4). Standard diagnostics from nonlinear dynamics are applied to the experimental data to establish the dynamical nature of the system. The route to chaos of the separated shear layer is identified.

EI

Hot-Wire Anemometers; Shear Layers; Turbulent Flow; Chaos; Wind Tunnels; Degrees of Freedom; Reynolds Number

19980012355

About vortex resistance of bodies flowed-along by plane flow of noncompressible medium

Postolovskij, S. N., Vserossijskij Nauchno-Issledovatel'skij i Proektno-Konstruktorskij Inst. Atomnogo Energeticheskogo Mashinostroeniya, Russian Federation; Tyazheloe Mashinostroenie; August, 1997, no. 8, pp. 28-31; In Russian; Copyright; Avail: Issuing Activity

High efficiency of electric power plants can be provided by the use of equipment connected with proper flow of noncompressible medium. Proper flow of noncompressible flow can be provided taking into account results of mathematical modelling. Construction of mathematical model in which the main kinematic and dynamic parameters of flow is very useful. Such model allows to determine the influence of some parameters on mode of flow along in the analytical form. On basis of such model, analytical dependences of kinematic and dynamic parameters of vortex wake on vorticity in point of flow separation. Results of calculations agree with experimental data.

EI

Boundary Layer Separation; Separated Flow; Hydrodynamics; Nuclear Power Plants; Thermoelectric Power Generation; Mathematical Models; Aerodynamics

19980012731

Effects of ship hull and propeller on rudder cavitation

Shen, Young T., Naval Surface Warfare Cent., USA; Remmers, Kenneth D.; Jiang, Chen W.; Journal of Ship Research; September, 1997; ISSN 0022-4502; Volume 41, no. 3, pp. 172-180; In English; Copyright; Avail: Issuing Activity

Ship trial observation and drydock inspection of a surface ship combatant show that rudder cavitation can be a real problem in terms of ship operation and maintenance. A project has been initiated by the Navy (a) to identify fleet rudder cavitation problem, (b) to investigate experimentally and numerically hull/propeller effects on rudder cavitation, and (c) to develop methods to incorporate propeller/rudder interaction into the future rudder design for cavitation improvement. Experiments were carried out at the Navy's Large Cavitation Channel (LCC) with a geosim model of a fleet rudder, propeller and ship hull of a surface combatant. Two-component Laser Doppler Velocimetry (LDV) was used to measure the field velocity and inflow angles in the propeller slipstream. A dynamometer and pressure taps were used to measure rudder lift, drag and pressure distributions. Influence of the ship hull and propeller on rudder forces, pressure distribution, and cavitation performance are compared with numerical calculations. The resemblance between the model rudder cavitation pattern in the LCC and full-scale cavitation erosion pattern observed in the dry dock is discussed.

Author (EI)

Cavitation Flow; Pressure Distribution; Ship Hulls; Rudders; Hulls (Structures); Ships; Marine Propulsion; Propellers; Hydrodynamics

19980013179 Scientific Research Associates, Inc., Glastonbury, CT USA

Flow in Serpentine Coolant Passage with Trip Strips

Tse, David, Scientific Research Associates, Inc., USA; 1996 Coolant Flow Management Workshop; Aug. 1997, pp. 65-82; In English; Also announced as 19980013176; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

In advanced gas turbine engines increased temperatures, stage pressure ratios and rotor speeds are used to increase thrust/weight ratio and to reduce specific fuel consumption. Efficient internal cooling is essential to maintain structural integrity. Rotation gives rise to Coriolis and buoyancy forces which can significantly alter the local heat transfer in the coolant passage. A better understanding of interaction of Coriolis, buoyancy and trip induced secondary flows and the capability to predict heat transfer response to these effects is necessary for achieving efficient cooling. The complex coupling of Coriolis and buoyancy forces has led many investigators to study the heat transfer characteristics of rotating cooling passages. There were significant increases in heat transfer at the turns and there were considerable differences between inward and outward flow in the straight passage. Velocity fields played an important role in convective heat transfer. In practice, cooling passages contain trips, which create secondary flow to augment heat transfer. This presentation deals with flow in a serpentine passage with ribbed walls.

Author

Fluid Flow; Coolants; Gas Turbine Engines; Temperature Dependence; Pressure Ratio; Rotation; Velocity Distribution; Serpentine

19980013182 Texas A&M Univ., Dept. of Mechanical Engineering, College Station, TX USA

Heat Transfer Local Distributions in Rotating Multipass Channels with Bleed

Lau, Sai C., Texas A&M Univ., USA; Park, C. W., Texas A&M Univ., USA; Kukreja, R. T., Texas A&M Univ., USA; Kandis, M., Texas A&M Univ., USA; 1996 Coolant Flow Management Workshop; Aug. 1997, pp. 103-114; In English; Also announced as 19980013176; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The main objective is to make available detailed local experimental data with rotating multipass channel models: to enable better understanding of the effects of rotation, sharp turns, channel geometry, and rib turbulators on the heat transfer distributions in cooling serpentine passages in modern gas turbine blades; and to help improve the design of these cooling passages.

Author

Heat Transfer; Flow Distribution; Pressure Reduction; Turbine Engines; Evaporative Cooling

19980013186 NASA Lewis Research Center, Cleveland, OH USA

The Effect of Tabs on a Jet in a Cross-Flow

Zaman, Khairul, NASA Lewis Research Center, USA; VanZante, Judith Foss, NASA Lewis Research Center, USA; 1996 Coolant Flow Management Workshop; Aug. 1997, pp. 181-190; In English; Also announced as 19980013176; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

A tab placed on the leeward side of the nozzle was expected to increase jet penetration into the cross-flow. An experiment at UTRC showed insignificant effect. The primary objective of the present study was to confirm and explain the ineffectiveness. The overall approach of the study was to conduct experiments in a low-speed wind tunnel and to conduct hot-wire measurements for mean velocity and streamwise vorticity fields.

Author

Jet Flow; Cross Flow; Vorticity; Tabs (Control Surfaces); Wind Tunnel Tests

19980013189 NASA Lewis Research Center, Cleveland, OH USA

Investigation of Rotor Wake Effects on Film Cooling

Heidmann, James D., NASA Lewis Research Center, USA; 1996 Coolant Flow Management Workshop; Aug. 1997, pp. 225-237; In English; Also announced as 19980013176; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The following are conclusions and recomendations from the study. Primary wake effect is linear reduction in (eta) with St. Secondary wake effect is skewing of suction/pressure side cooling. Steady computations match experimental Nu, but overpredict (eta). Unsteady computations elucidate wake/film interaction. Model may be used to estimate wake passing effect. Need boundary layer and full stage experiments. Need resolved film hole and full stage unsteady computations. Need validated turbulence models for film cooling.

Author

Turbulent Wakes; Rotor Aerodynamics; Film Cooling

19980013192 General Electric Co., Aircraft Engines, Cincinnati, OH USA

Turbine Airfoil Film Cooling: Design Integration

Bergholz, Robert, General Electric Co., USA; 1996 Coolant Flow Management Workshop; Aug. 1997, pp. 285-297; In English; Also announced as 19980013176; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Transient test facility built to determine both heat transfer and film effectiveness in linear airfoil cascades. Steady-state operation provides film effectiveness. Base line test conducted with cylinders in cross flow. Stagnation point heat transfer agrees with established correlations. Linear airfoil cascade show: (1) mach number distributions agree with inviscid code predictions; (2) airfoil heat transfer coefficients measured with plugged film holes follow boundary layer code predictions; and (3) film injection increases heat transfer levels both on pressure and suction sides.

Author

Turbines; Airfoils; Film Cooling; Design Analysis; Hole Geometry (Mechanics); Computational Fluid Dynamics

19980013377

Silencers of flue gas path of gas-turbine plant

Tupov, V. B., Moskovskij Energeticheskij Inst., Russian Federation; Teploenergetika; February, 1996; ISSN 0131-7067, no. 2, pp. 60-63; In Russian; Copyright; Avail: Issuing Activity

Environmental protection requires to reduce the noise level at thermoelectric power plants. Flue gas path of gas-turbine plant is source of strong noise. Application of silencers allows to reduce the noise. Various types of dissipative and active silencers are considered. New dissipative silencer has been developed at Moscow Power Institute taking into account aerodynamic effects of flue gas path of gas-turbine plant. This silencer provides required level of noise. Schemes of perspective silencers of flue gas paths of gas-turbine plants are given. Recommendations on application of dissipative and active silencers are given.

EI

Flue Gases; Noise Pollution; Control Equipment; Thermoelectric Power Generation; Gas Turbines; Aerodynamics

19980013585

Fin efficiency and mechanisms of heat exchange through fins in multi-stream plate-fin heat exchangers: development and application of a rating algorithm

Prasad, B. S. V., Bharat Heavy Plate and Vessels Ltd., India; International Journal of Heat and Mass Transfer; November-December, 1997; ISSN 0017-9310; Volume 40, no. 18, pp. 4279-4288; In English; Copyright; Avail: Issuing Activity

The basic heat balance equations for separating surface and passage in a multi-stream plate-fin heat exchanger are derived based on a formalism proposed earlier [Prasad, International Journal of Heat and Mass Transfer 1996, 39(2), 419-428]. An algorithm is developed for rating heat exchangers based on the equations, and incorporated into an existing computer code called STACK [Prasad, Heat Transfer Engineering, 1991, 12(4), 58-70]. The program is used to analyse some typical heat exchangers. It was found that though transverse conduction could be present in some and absent in some passages, it tended to play an increasingly important role as fin effectiveness increased. of the three mechanisms of heat exchange identified, Mechanism 1 and Mechanism 3 dominated at low fin effectiveness, whereas Mechanism 2 tended to dominate at high fin effectiveness. It was found that the developed method reliably predicted heat transfer in special situations such as the presence of dummy passages, where other methods were known to fail.

Author (EI)

Heat Balance; Heat Exchangers; Heat Transfer; Conductive Heat Transfer; Fins; Efficiency; Algorithms; Mathematical Models

19980014488

Numerical investigation of three-dimensional compressible flows induced by a train moving into a tunnel

Ogawa, Takanobu, Shimizu Corp., Japan; Fujii, Kozo; Computers & Fluids; July, 1997; ISSN 0045-7930; Volume 26, no. 6, pp. 565-585; In English; Copyright; Avail: Issuing Activity

A three-dimensional flow induced by a practical high-speed train moving into a tunnel is studied by the computation of the compressible Navier-Stokes equations with the zonal method. The transient flow field induced by tunnel entry is investigated with the focus on the compression wave which is the source of the booming noise at the tunnel exit. The results reveal a pressure increase inside the tunnel before tunnel entry, the one-dimensionality of the compression wave, the histories of the aerodynamic forces, etc. The computed pressure histories inside the tunnel agree with the field measurement data. The flow fields are also computed

for cases where the train runs on differently positioned tracks into the tunnel. The results indicate that the wavefront of the compression wave is affected by the train position and this phenomenon is explained by the parameter v(sub wall).
Author (EI)
Compression Waves; Three Dimensional Flow; Compressible Flow; Numerical Analysis; Navier-Stokes Equation; Rail Transportation; Aerodynamics

19980015006
Heat transfer and friction correlations for wavy plate fin-and-tube heat exchangers
Kim, N. -H., Univ. of Inchon, Republic of Korea; Yun, J. -H.; Webb, R. L.; Journal of Heat Transfer, Transactions ASME; August, 1997; ISSN 0022-1481; Volume 119, no. 3, pp. 560-567; In English; Copyright; Avail: Issuing Activity

This paper deals with heat exchangers having plate fins of herringbone wave configuration. Correlations are developed to predict the air-side heat transfer coefficient and friction factor as a function of flow conditions and geometric variables of the heat exchanger. Correlations are provided for both staggered and in-line arrays of circular tubes. A multiple regression technique was used to correlate 41 wavy fin geometries by Beecher and Fagan (1987), Wang et al. (1995), and Beecher (1968). For the staggered layout, 92 percent of the heat transfer data are correlated within +/- 10 percent and 91 percent of the friction data are correlated within +/- 15 percent.
Author (EI)
Heat Transfer; Tube Heat Exchangers; Fins; Heat Transfer Coefficients; Correlation; Regression Analysis

19980015083
Boundary layer transition under high free-stream turbulence and strong acceleration conditions: Part 2 - turbulent transport results
Volino, R. J., USA Naval Acad., USA; Simon, T. W.; Journal of Heat Transfer, Transactions ASME; August, 1997; ISSN 0022-1481; Volume 119, no. 3, pp. 427-432; In English; Copyright; Avail: Issuing Activity

Measurements from heated boundary layers along a concave-curved test wall subject to high (initially 8 percent) free-stream turbulence intensity and strong (K = (nu/U(sub infinity)(sup 2)) dU(sub infinity)/dx) as high as 9 x 10(sup -6)) acceleration are presented and discussed. Conditions for the experiments were chosen to roughly simulate those present on the downstream half of the pressure side of a gas turbine airfoil. Turbulence statistics, including the turbulent shear stress, the turbulent heat flux, and the turbulent Prandtl number are presented. The transition zone is of extended length in spite of the high free-stream turbulence level. Turbulence quantities are strongly suppressed below values in unaccelerated turbulent boundary layers. Turbulent transport quantities rise with the intermittency, as the boundary layer proceeds through transition. Octant analysis shows a similar eddy structure in the present flow as was observed in transitional flows under low free-stream turbulence conditions. to the authors' knowledge, this is the first detailed documentation of a high-free-stream-turbulence boundary layer flow in such a strong acceleration field
Author (EI)
Boundary Layer Transition; Free Flow; Convective Heat Transfer; Boundary Layer Flow; Turbulent Flow; Gas Turbines; Airfoils

19980016230
To characterize two-phase flows around finned tube by using 3D-PDA and numerical calculation
Liang, Shaorong, Zhejiang Univ., China; Yan, Jianhua; Qiu, Kunzan; Li, Xiaodong; Ni, Mingjiang; Cen, Kefa; Zhongguo Dianji Gongcheng Xuebao/Proceedings of the Chinese Society of Electrical Engineering; July, 1997; ISSN 0258-8013; Volume 17, no. 4, pp. 230-233; In Chinese; Copyright; Avail: Issuing Activity

By using a Three-Dimension Particle Dynamics Analyzer (PDA), cool experimental study on characteristic of gas-solid two-phase flow around the finned-tube, which is the element of impact separator used in Circulating Fluidized Bed Boiler (CFBB), has been conducted. In this paper, the parameters such as velocity field and turbulent intensity are analyzed. And, the two-phase flow are also numerically calculated through SIMPLER Cell and k-epsilon Double Model combined with FSRT Model (Fluctuation-Spectrum-Random-Trajectory Model). Both results from experiment and numerical calculation are essentially identical. The results are very useful to guide the design and structure optimization of the gas-solid separator with enhanced-heat transfer unit-finned tube.
Author (EI)
Finned Bodies; Two Phase Flow; Fins; Heat Transfer; Computational Fluid Dynamics; Fluidized Bed Processors; Flow Measurement

19980016536

Simple hydrodynamic model for the liquid circulation velocity in a full-scale two- and three-phase internal airlift reactor operating in the gas recirculation regime

Heijnen, J. J., Delft Univ. of Technology, Netherlands; Hols, J.; van der Lans, R. G. J. M.; van Leeuwen, H. L. J. M.; Mulder, A.; Weltevrede, R.; Chemical Engineering Science; August, 1997; ISSN 0009-2509; Volume 52, no. 15, pp. 2527-2540; In English; Copyright; Avail: Issuing Activity

For design purposes a simple model to predict the hydrodynamic behavior of a three-phase internal airlift reactor is developed. The model predicts liquid circulation, gas hold-up and minimum gas supply rates for solids suspension. The reactor type considered has an internal riser and is not equipped with a gas disengagement area, resulting in a high downcomer gas flow rate. Its purpose is waste water treatment using biofilm particles. First it is recognized that several flow regimes may be distinguished, necessitating different models. Modelling for the gas recirculation regime is straightforward based on the momentum balance combined with a simple assumption for the gas hold-up that is possible for these type of airlift reactors with unrestricted gas carry-over into the downcomer. The predictive model is compared successfully with a pilot-scale reactor (400 l) and a full-scale reactor (284 m(sup 3), both with a draught tube height of about 12 m) containing up to 250 g/l solid particles with superficial gas supply rates up to 0.1 m/s.

Author (EI)

Air Transportation; Bioreactors; Mathematical Models; Hydrodynamics; Flow Distribution; Gas Dynamics

19980016538

On impeller circulation and mixing effectiveness in the turbulent flow regime

Nienow, A. W., Univ. of Birmingham, UK; Chemical Engineering Science; August, 1997; ISSN 0009-2509; Volume 52, no. 15, pp. 2557-2565; In English; Copyright; Avail: Issuing Activity

Impeller effectiveness has often been evaluated via either mixing time, theta(sub m), or flow number, Fl; and a direct connection between the two has also been assumed in some cases. Here, these concepts are considered in the light of recent theoretical and experimental work. It is shown that an equation for mixing time recently published by BHR Group can be related to a basic turbulence model. It is also shown that this equation is superior to those based on a theory linking mixing time to the flow generated by the impeller. The new equation and theory implies that all impeller types of equal impeller-to-tank diameter ratio are equally energy efficient in achieving overall homogenization. On the other hand, impeller efficiency based on the flow generated, as measured by laser Doppler anemometry at equal measured power, suggests a significant difference between impeller types.

Author (EI)

Laser Anemometers; Turbulent Flow; Mixing; Mathematical Models; Turbulence; Rotors

19980016712 NASA Lewis Research Center, Cleveland, OH USA

Seals/Secondary Flows Workshop 1996, Volume 2

Hendricks, Robert C., Editor, NASA Lewis Research Center, USA; Oct. 1997; 500p; In English; Seals/Secondary Flows Workshop 1996, 23-24 Oct. 1997, Cleveland, OH, USA; Also announced as 19980016713 through 19980016731; Original contains color illustrations

Contract(s)/Grant(s): RTOP 233-1B-1B

Report No.(s): NASA-CP-10198/Vol-2; NAS 1.55:10198/Vol-2; E-10936/Vol-2; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44135), Hardcopy, Microfiche

This workshop has four categories. (1) In the opening sessions we are attempting to provide an overview of engine technology, applications and perceived needs from both a global and the seal/secondary flow perspective. (2) In the second sessions we are attempting to present more details of seal and secondary flow components requirements, designs, and solutions. (3) In the third sessions we examine some of the tools available to assess the flows, loads and life for turbomachines. (4) In the fourth session we examine some of the new technologies available to turbomachine designers. Synergistic coupling of these categories brings another dimension of reality to efforts both at NASA LeRC and via contractors to expand U.S. aerospace technology and market-share. In general, company sensitive materials are probably not included even though the workshop participation was - and this publication is - limited to U.S. Citizens and OEM'S.

Author

Secondary Flow; Turbomachinery; Seals (Stoppers); Conferences; Gas Turbine Engines; Aircraft Engines

19980016778 National Aerospace Lab., Aerodynamics Div., Amsterdam, Netherlands

Development of a Fully Automated CFD System for Three-Dimensional Flow Simulations Based on Hybrid Prismatic-Tetrahedral Grids

vanderBurg, J. W., National Aerospace Lab., Netherlands; Maseland, J. E. J., National Aerospace Lab., Netherlands; Oskam, B., National Aerospace Lab., Netherlands; Jan. 17, 1996; 25p; In English

Report No.(s): PB97-212484; NLR-TP-96036-U; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this paper an assessment of CFD methods based on the underlying grid type is made. It is safe to say that emerging CFD methods based on hybrid body-fitted grids of tetrahedral and prismatic cells using unstructured data storage schemes have the potential to satisfy the basic requirements of problem-turnaround-time and accuracy for complex geometries. The CFD system described in this paper is based on the hybrid prismatic-tetrahedral grid approach. In an analysis it is shown that the cells in the prismatic layer have to satisfy a central symmetry property in order to obtain a second-order accurate approximation of the viscous terms in the Reynolds-averaged Navier-Stokes equations. Prismatic grid generation is demonstrated for the ONERA M6 wing-alone configuration and the AS28G wing/body configuration.

NTIS

Aerodynamic Configurations; Body-Wing Configurations; Grid Generation (Mathematics); Navier-Stokes Equation; Reynolds Averaging; Reynolds Equation; Three Dimensional Flow

19980012227

Preliminary intercomparison of anemometer calibration systems at very low speeds between the national standard laboratories in Japan and the USA

Terao, Yoshiya, Natl. Research Lab. of Metrology, Japan; Takamoto, Masaki; Mattingly, George E.; JSME International Journal, Series B: Fluids and Thermal Engineering; August, 1997; ISSN 1340-8054; Volume 40, no. 3, pp. 509-515; In English; Copyright; Avail: Issuing Activity

An international comparison of air speed standards has been conducted by Japan and the USA using anemometers. The national standard for low air speed measurement in Japan uses a tow carriage system with a laser-based speed determination system. In the USA, a specially designed low-speed wind tunnel equipped with a laser Doppler anemometer comprises the national standard. Two anemometers, one thermal and one ultrasonic, were selected as the transfer standards, and these were tested in the air speed range of 0.1 to 1 m/s. The results showed the two national standards to agree within the calibration uncertainties which were nominated to be between 1% and 9%. The results also indicated that the thermal anemometer used in this program had a transient characteristic and a sensitivity to the atmospheric pressure that required special analysis and data handling procedures. These characteristics and the procedures implemented are discussed and explanations are given that should improve future testing.

Author (EI)

Flow Measurement; Anemometers; Laser Doppler Velocimeters; Velocity Measurement; Wind Tunnels

19980012165

Exergetic estimation of the thermodynamic perfection of compressors

Evenko, V. I., Inst. Transportnogo Mashinostroeniya, Russian Federation; Teploenergetika; March, 1997; ISSN 0131-7067, no. 3, pp. 59-63; In Russian; Copyright; Avail: Issuing Activity

Shortcomings of the isothermal, adiabatic and polytrope efficiencies and expediency of estimation of the compressor perfection by the exergetic efficiency are shown. The notions are considered of the exergetic efficiency of a compressor and compressor plant with taking into account practical usage of the exergy of the heat removed from the gas in intermediate and end coolers. Possibilities of the compressor efficiency increase, decreasing the cooler specific metal content and the cooling water flow rate, choice of compressor stage number and search for technical solutions of rational employment of the exergy of the heat in heat exchangers are found.

EI

Compressors; Thermodynamics; Efficiency; Estimating; Heat Transfer

19980012345

Calculation of characteristics of the compressors, compressing moist air

Sherstyuk, A. N.; Troshkin, O. A.; Tarasova, L. A.; Orbis-Dias, V. S.; Khimicheskoe I Neftyanoe Mashinostroenie; July-August, 1997; ISSN 0023-1126, no. 4, pp. 58; In Russian; Copyright; Avail: Issuing Activity

Moisture availability changes the parameters of compressible air, that causes a change of machinery performance and must be taken into account during its design. The compressor calculation is carried out by a procedure taken for compressor, providing homogeneous gas compression with the appropriate values of gas constant, heat capacity and isoentropy index. Assumption is

made that permits to consider moist air as a homogeneous gas and calculate its physical constants. The approximate relations are obtained, allowing to evaluate effect of moisture of compressible gas on the compressor operation parameters.
EI
Gas Mixtures; Compressors; Parameter Identification; Air; Moisture

19980013375
Parameters of gas turbine plants with water injection into compressor
Arsen'ev, L. V., Sankt-Peterburgskij Gosudarstvennyj Tekhnicheskij Univ., Russian Federation; Berkovich, A. L.; Teploenergetika; June, 1996; ISSN 0131-7067, no. 6, pp. 18-22; In Russian; Copyright; Avail: Issuing Activity

Different methods of the improvement of gas turbine plant indicators by means of the injection of the water-vapor working body into the gas-air channel of the plant have been compared. The influence of the water injection into the flowing part of a compressor on its parameters as well as on working indicators of a gas turbine plant has been investigated. The technique for calculating the compressor with regard to the water motion and the water evaporation into the flowing part has been developed. It has been shown that the water injection into the compressor flowing part has been the most effective method. Its application in a power gas turbine plant has allowed to increase the electrical power generation by 17% at the simultaneous growth of the efficiency by 6.5%.
EI
Gas Turbines; Water Injection; Water Vapor; Electric Power Plants; Compressors; Vapors; Fluid Flow

19980013407
Small power turbines with counterpressure of the 'Turboatom' association
Levchenko, E. V., NPO 'Turbatom', Ukraine; Arkad'ev, B. A.; Kantemir, A. D.; Teploenergetika; January, 1997; ISSN 0131-7067, no. 1, pp. 31-35; In Russian; Copyright; Avail: Issuing Activity

Small power turbines with counterpressure are described. The turbines are intended for supplying by electric power and steam of industrial enterprises and other objects with a stable schedule of heat consumption. The main technical characteristics of these turbines are presented. All turbines are calculated at the nominal counterpressure of 0.294 MPa and admit the operation without limitation of the steam flow rate in the pressure range of 0.245-0.39 MPa. The system of turbine control and protection is based on the principle of its separation in the control system and the emergency protection one. Specific features of these systems are described. At present the serial production of these turbines at the 'Turboatom' association is mastered.
EI
Steam Turbines; Rotors

19980013569
Extraction turbines for reconstruction, expansion, and creation of new heat-electric generation plants
Kortenko, V. V., AO 'Turbomotornyj Zavod', Russian Federation; Barinberg, G. D.; Elektrotekhnika; September, 1997; ISSN 0013-5860, no. 9, pp. 40-45; In Russian; Copyright; Avail: Issuing Activity

New extraction turbines of PT-150/160-12,8/0,9 and TR-110-12,8 types made at 'Turbomotornyj Zavod' joint stock company are presented. Technical data of these steam turbines are described. The cooling systems are described. Advantages of these new turbines in comparison with old turbines are shown. New design rotor of the turbine is described. Constructive particularities in these new turbines are described. Economical efficiency of these turbines is shown. The turbine of PT-150/165-12,8/0,9 type can be installed instead of turbine of P-140/165-12,8/0,9. The turbine of TP-110-12,8 type can be installed instead of the turbine of T-110/120-12,8-5 type.
EI
Control Valves; Electric Generators; Heat Generation; Steam Turbines; Thermoelectric Power Generation; Cooling Systems; Valves; Rotors

19980013908
Aerodynamic principles of designing the control valves of steam turbines
Zaryankin, A. E., Moskovskij Energeticheskij Inst., Russian Federation; Chernoshtan, V. I.; Teploenergetika; January, 1997; ISSN 0131-7067, no. 1, pp. 51-54; In Russian; Copyright; Avail: Issuing Activity

Connection between the flow character in valve channels and the reliability of control valves of steam turbines is considered. Some designs of the control valves are analysed from the point of view of their reliability. A set of recommendations on designing these valves is formulated. The experience of industrial operation of the described control valves in the aerodynamic plane con-

firms completely the principles inherent in their designing. These principles permitted to reduce losses in the steam inlet system of steam turbines to 1.5-2% of the initial steam pressure on the simultaneous reliability increase.
EI
Control Valves; Steam Turbines; Aerodynamics; Relief Valves; Valves; Fluid Flow

19980015647 General Electric Co., Advanced Engineering Programs Dept., Cincinnati, OH USA
Thin Dense Chrome Bearing Insertion Program ***Final Report, 1 Mar. 1992 - 1 Dec. 1996***
Rhoads, Mark, General Electric Co., USA; Shucktis, Bernie, General Electric Co., USA; Johnson, Michael, General Electric Co., USA; Mar. 1997; 162p; In English
Contract(s)/Grant(s): F33615-92-C-2208; AF Proj. 3048
Report No.(s): AD-A330677; R97AEB141; WL-TR-97-2053; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This report includes the results of program efforts to develop and introduce a modular Thin Dense Chrome (TDC) plating process for aircraft engine mainshaft bearings. program objectives included development of a Thin Dense Chrome material/process specification and completing a thorough evaluation of all potential risks associated with introducing TDC coated Bearings into field engine applications. A comprehensive series of subscale and full scale tests were completed to evaluate the capabilities of TDC coated bearings at various inservice operating conditions. TDC coated bearings demonstrated improved corrosion and contamination resistance. TDC coated bearings also demonstrated acceptable performance during thermal cycle, oil-off, and induced defect conditions. However, the TDC coating performance did not meet the required objectives in the areas of rolling contact fatigue life, skid damage resistance, engine assembly damage tolerance, and engine operational endurance. Based on the results of this program, it was concluded that TDC coated bearings provided too great of a risk for insertion into the mainshaft bearing positions of military aircraft engines.
DTIC
Aircraft Engines; Corrosion Resistance; Fatigue Life; Full Scale Tests; Specifications; Tolerances (Mechanics)

19980016231
Study on design methods of the guide-vane bladed-rotor classifier
Kong, Wenjun, Chinese Acad. of Sciences, China; Cheng, Shangmo; Luan, Qingfu; Zhongguo Dianji Gongcheng Xuebao/Proceedings of the Chinese Society of Electrical Engineering; July, 1997; ISSN 0258-8013; Volume 17, no. 4, pp. 234-237, 258; In Chinese; Copyright; Avail: Issuing Activity

Design methods of the Guide-Vane Bladed-Rotor Classifier are studied theoretically and experimentally in this thesis. The correction curve of inlet mill total air flux for elevation is plotted and a formula of inlet mill total air flux for the rotor diameter is determined. Relation between the rotor speed and rotor diameter is given as well. Then, the correction curve of air flux for the designated cut coal fineness is acquired. Based on the above-mentioned work, the calculated curves for determining the rotor diameter and rotor speed in series design of the classifiers are worked out. The obtained curves can be conveniently used in engineering design.
Author (EI)
Guide Vanes; Classifiers; Rotors; Fluid Flow; Turbomachine Blades; Computation

19980016713 Pratt and Whitney Aircraft, West Palm Beach, FL USA
Brush Seal Technology Transition
Moore, Ken, Pratt and Whitney Aircraft, USA; Seals/Secondary Flows Workshop 1996; Oct. 1997; Volume 2, pp. 465-475; In English; Also announced as 19980016712; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44135), Hardcopy, Microfiche

The paper will touch on three basic areas. It will look at the barriers to brush seal technology transition. There are two types of barriers to transitioning brush seal technology, or any type of seal, into engines. The first type of barrier are those that have to do with the seal itself, cost, performance, wear, temperature capability, and so on. The second type of barrier are those that are not related to the seal but can preclude the incorporation of advanced seals because the flow level in a given cavity can not be reduced due to windage heat generation or gaspath ingestion. Secondly, an update will be provided on tuft wear testing that is being done at NASA Lewis. Lastly, the paper will touch on the status of transitioning brush seals into two engines, the F100-PW-229 and the F119-PW-100.
Derived from text
Brush Seals; Thermal Resistance; Wear Resistance; Gas Turbine Engines; Wear Tests; Heat Generation

19980016719 NASA Lewis Research Center, Cleveland, OH USA

The Impact of Seal Leakage Flow on the Performance of Multi-Stage Axial Flow Compressors

Adamczyk, John J., NASA Lewis Research Center, USA; Seals/Secondary Flows Workshop 1996; Oct. 1997; Volume 2, pp. 621-630; In English; Also announced as 19980016712; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44135), Hardcopy, Microfiche

To enhance the performance of multi-stage axial flow compressors beyond today's machines, it is becoming increasingly clear that the impact of under-platform seal leakage flow on the primary passage flow stream must be understood at a more fundamental level than exists today. Furthermore, analytical or semi-empirical models must be developed to account for the effect of under-platform leakage in CFD simulation codes so that these leakages are accounted for in numerical simulations. Finally, based on the results obtained from research studies, information must be drawn as to how to manage these leakage flows so as to minimize their impact on performance and, if possible, enhance performance.

Author

Leakage; Turbocompressors; Seals (Stoppers); Secondary Flow; Compressibility Effects; Axial Flow

19980016728 NASA Lewis Research Center, Cleveland, OH USA

More Electric Commercial Aircraft Engines (Integral Starter/Generator and Magnetic Bearings)

Kascak, A. F., NASA Lewis Research Center, USA; Brown, G. V., NASA Lewis Research Center, USA; Stefko, G. L., NASA Lewis Research Center, USA; Seals/Secondary Flows Workshop 1996; Oct. 1997; Volume 2, pp. 819-846; In English; Also announced as 19980016712; No Copyright; Avail: Issuing Activity (R and T Directorate, Lewis Research Center, Cleveland, OH 44125), Hardcopy, Microfiche

The advantages of replacing rolling element bearings with magnetic bearings on the gas generator shaft of a commercial aircraft engine are discussed. This is part of a system that would replace the tower shaft of the engine with an integral starter/generator on the gas generator shaft; thereby, eliminating the lubrication system and using less secondary air flow to the bearing compartments. Details of the proposed system are presented.

CASI

Aircraft Engines; Commercial Aircraft; Gas Generators; Magnetic Bearings; Engine Design

19980016776 Technische Univ., Delft, Netherlands

Development of the Generic Thermodymanic Turboshaft Engine Real-Time Simulation (TERTS) Model

van Oosterhout, W. W. P. J., Technische Univ., Netherlands; van Gool, P. C. A., Technische Univ., Netherlands; Dec. 1996; 127p; In English

Report No.(s): PB97-208375; M-790; Copyright Waived; Avail: CASI; A07, Hardcopy; A02, Microfiche

The report describes the development of a turboshaft engine real-time simulation model. This model, denoted TERTS (Turboshaft Engine Real-Time Simulation), provides the programming environment MAT-LAB/Simulink with a model to predict steady state performance and transient responses of a generic turboshaft engine. TERTS is an off-design component stacking model, making it possible to build turboshaft engine models by arranging components according to the actual engine configuration. Off-design characteristics of the components are described either by thermodynamic relations or component maps. With these relations and maps internal processes in the engine are described. Effects of deviating operating conditions (a.o. flight conditions, customer bleed extraction, engine component degradation) are implicitly included.

NTIS

Computerized Simulation; Turboshafts; Turbine Engines; Real Time Operation; Mathematical Models; Thermodynamic Properties; One Dimensional Flow

13
GEOSCIENCES

Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

19980013367

Prospects and concepts of improvement in outlet circuit of low-pressure cylinders of steam turbines

Kasilov, V. F., Moskovskij Energeticheskij Inst., Russian Federation; Elektrotekhnika; September, 1997; ISSN 0013-5860, no. 9, pp. 46-52; In Russian; Copyright; Avail: Issuing Activity

Efficiency of steam turbines is dependent on the design of their outlet circuits. Concepts of improvement in outlet members of low-pressure cylinders of steam turbines are presented. Opportunities for improvement in the outlet circuit consisting of outlet branch pipe of low-pressure cylinder, transient channel, and condenser neck are considered. Analysis of design of low-pressure cylinder and its parameters is described. Application of diffuser design of outlet branch pipe od low-pressure cylinder offers advantages. Designing the outlet branch pipes with the use of physical model of flow twisting is grounded.
EI
Low Pressure; Steam Turbines; Thermoelectric Power Generation; Steam; Mathematical Models; Aerodynamics

19980013573

New control valves of steam turbines, their characteristics, and experience in operation

Zaryankin, A. E., Moskovskij Energeticheskij Inst., Russian Federation; Simonov, B. N.; Elektrotekhnika; September, 1997; ISSN 0013-5860, no. 9, pp. 18-22; In Russian; Copyright; Avail: Issuing Activity

Efficiency of steam turbines is dependent on number of failures. Experience in operation of turbines shows that many failures are connected with damages of control valves. Problems in improvement in control valves are considered. Enhancement of design of the control valves is analyzed. Aerodynamic, force, and vibration characteristics of new control valves are compared with those of standard valves are considered. Author inspection has shown that new control valves are very reliable. Visual inspection of the control valves after 4-8 years of operation has shown low erosion wear. Experience in modernization of the control valves shows that technological simplification is advisable.
EI
Aerodynamic Characteristics; Control Valves; Steam Turbines; Valves; Nuclear Power Plants; Thermoelectric Power Generation; Mathematical Models

19980016428

Trailing edge wedge flaps for wind-turbine blades

Bloy, A. W., Univ. of Manchester, UK; Tsioumanis, N.; Wind Engineering; 1997; ISSN 0309-524X; Volume 21, no. 1, pp. 39-44; In English; Copyright; Avail: Issuing Activity

Two-dimensional wind tunnel tests were made to obtain surface pressure distributions and wake profiles for the NACA 63(sub 2)-215 aerofoil fitted with a range of trailing-edge wedge flaps. Flap chords ranged from 1 1/3% to 3 1/3% of the aerofoil chord and flap deflections from 30 deg to 90 deg. Lift and drag data determined from the pressure measurements indicate that the maximum lift increases with both flap chord and flap deflection as expected. In general this improved lift performance is accompanied by improved lift-to-drag ratio at high angle of attack with a reduction in the lift-to-drag ratio at low angle of attack. For any selected maximum lift, however, improved lift-to-drag over the entire angle of attack range is achieved with a flap deflection less than the usual 90 deg flap deflection tested by other workers. For the range of flaps tested, optimum performance is achieved with thee 45 deg wedge flap which produces a maximum lift-to-drag ratio similar to that of the plain aerofoil.
Author (EI)
Trailing Edge Flaps; Turbine Blades; Wind Turbines; Turbomachine Blades; Wind Tunnels; Pressure Measurement; Wakes

19980014377

Computational study of the environmental fate of selected aircraft fuel system deicing compounds

Mushrush, George W., George Mason Univ., USA; Basak, Subhash C.; Slone, J. Eric; Beal, Erna J.; Basu, Subhash; Stalick, Wayne M.; Hardy, Dennis R.; Journal of Environmental Science and Health, Part A: Environmental Science and Engineering & Toxic and Hazardous Substance Control; September, 1997; ISSN 1077-1204; Volume 32, no. 8, pp. 2201-2211; In English; Copyright; Avail: Issuing Activity

The current fuel system icing inhibitor (FSII) additives used for commercial and military aircraft are ethylene glycol mono methyl ether (EGME) and diethylene glycol mono methyl ether (DiEGME). Propylene glycol is used for wing deicing. Fuel deicing additives are required in military fuels an optional in commercial fuels with wing deicing being weather dependent. The acetals and ketals of reduced sugars are being synthesized and modeled computationally because they are less toxic and more environmentally benign than EGME and DiEGME. Each compound is being studied with an emphasis on deicing effectiveness, human toxicity, and environmental hazard. This paper reports on three compounds derived from the sugar mannose.
Author (EI)
Aircraft Fuel Systems; Ethylene Compounds; Fuel Systems; Ice Formation; Jet Engine Fuels; Methyl Compounds; Environmental Surveys; Ice; Aircraft Fuels; Additives; Ethers

19980015143 Naval Facilities Engineering Command, Norfolk, VA USA

Draft Environmental Impact Statement. Realignment of F/A-18 Aircraft and Operational Functions from Naval Air Station (NAS) Cecil Field, Florida, to Other East Coast Installations: Appendix Volume

Jan. 1997; 516p; In English

Report No.(s): AD-A329791; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

Pursuant to Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1669, as implemented by the Council on Environmental Quality regulations (40 CFR Parts 1500-1508), the Department of the Navy announces its intent to prepare an Environmental Impact Statement (EIS) to evaluate the potential environmental consequences of the realignment of F/A-18 aircraft and their associated personnel to Naval Air Station (NAS) Oceana, located in Virginia Beach. Virginia. This action is being conducted in accordance with the Defense Base Closure and Realignment Act of 1990 (Pub. L. 101-510), as implemented during 1995. In accordance with congressional direction implementing the 1995 recommendations of the Defense Base Closure and Realignment Commission (BRAC 95) the Navy will close NAS Cecil Field, Florida, and realign F/A-18 aircraft, personnel, and ancillary activities associated with the existing F/A-18 aircraft, personnel, and ancillary activities associated with the existing F/A-18 missions.

DTIC

F-18 Aircraft; Environment Management; Environmental Quality; Environmental Surveys; Jet Aircraft; Fighter Aircraft; Military Air Facilities

19980015169 NASA Washington, Washington, DC USA

Global Atmospheric Effects of Aviation: Report of the Proceedings of the Symposium

May 1997; 106p; In English; Global Atmospheric Effects of Aviation, 15-19 Apr. 1996, USA

Report No.(s): PB97-183297; NASA-CP-3351; NAS 1.55:3351; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The objective of the organizers of the Symposium on the Global Atmospheric Effects of Aviation was to bring scientific, technology, and policy leaders together to review the status of all relevant atmospheric research, for discussion of potential mitigation measures, and to consider what policy-relevant information may be available to decision makers in the next few years. Specially-focused studies to understand and reduce aviations's environmental impact are currently supported and carried out by governments and other organizations throughout the world. Scientific assessments in support of the Montreal Protocol, which recently have included consideration of aviation, are conducted by the Protocol's Ozone Science Panel. The Intergovernmental Panel on Climate Change provides scientific-technical advice to the Framework Convention on Climate Change and its assessments independently to all governments for their use in national policy making. Standards to control emissions from aircraft are established by the International Civil Aviation Organization (ICAO)- itself a United Nations specialized agency, based upon recommendations from its Committee on Aviation Environmental Protection (CAEP).

NTIS

Air Transportation; Atmospheric Effects; Environment Effects; Civil Aviation; Environment Protection; Conferences; Jet Exhaust; Exhaust Emission; Atmospheric Chemistry; Airline Operations

19980015336 Radian Corp., Research Triangle Park, NC USA

Criteria Pollutant Emissions from Internal Combustion Engines in the Natural Gas Industry, Volume 1, Technical Report ***Final Report, Jun. 1994 - Dec. 1995***

Workman, G. S., Radian Corp., USA; Adams, R. G., Radian Corp., USA; Shareef, G. S., Radian Corp., USA; Feb. 1996; 87p; In English

Contract(s)/Grant(s): EPA-68-D2-0160T33; GRI-5091-274-2293

Report No.(s): PB96-168265; RAD-275-114/298-130-33-Vol-1; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The report contains emissions data for nitrogen oxides (NOx), carbon monoxide (CO), methane (CH4), ethane (C2H6), Non-Methane HydroCarbons (NMHC), and NonMethane-Ethane HydroCarbons (NMEHC) from stationary Internal Combustion (IC) engines and gas turbines used in the natural gas industry. Test results for individual engines tested are presented, along with full load engine family-specific factors, and the calculated emissions factors are evaluated relative to the emission factors published in EPA report AP-42. Units tested included eleven 2-stroke engines and five 4-stroke engines, with and without controls, and two gas turbines.

NTIS

Internal Combustion Engines; Gas Turbine Engines; Pollution Monitoring; Natural Gas; Industries; Air Pollution; Emission Spectra

19980015439 Radian Corp., Research Triangle Park, NC USA

Criteria Pollutant Emissions from Internal Combustion Engines in the Natural Gas Industry, Volume 2, Appendices A - I ***Final Report, Jun. 1994 - Dec. 1995***

Workman, G. S., Radian Corp., USA; Adams, R. G., Radian Corp., USA; Shareef, G. S., Radian Corp., USA; Feb. 1996; 451p; In English

Contract(s)/Grant(s): GRI-5091-274-2293; EPA-68-D2-0160T33

Report No.(s): PB96-168273; RAD-275-114/298-130-33-Vol-2; No Copyright; Avail: CASI; A20, Hardcopy; A04, Microfiche

Contents include the following: Sample Calculations; CEMS and Operation Data; CEMS Summary Data; GC Data; GC Summary Data; Raw Operating Data; Manual Measurement Data; Fuel Analysis Results; and Quality Assurance and Quality Control (QA/QC).

NTIS

Gas Turbine Engines; Pollution Monitoring; Computation; Natural Gas; Industries; Air Pollution; Data Bases; Exhaust Emission

19980016883 Naval Research Lab., Oceanography Div., Stennis Space Center, MS USA

Climatology of Wind and Waves from Satellite Altimeters

Hwang, Paul A., Naval Research Lab., USA; Teague, William J., Naval Research Lab., USA; Jacobs, Gregg A., Naval Research Lab., USA; Aug. 1997; 5p; In English; IGARSS 1997 International Geoscience and Remote Sensing Symposium, 3-8 Aug. 1997, Singapore

Report No.(s): AD-A331260; NRL/PP/7332--97-0013; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Based on comparisons with buoy data, the wind speed and wave height measured by satellite altimeters are in excellent agreement with in-situ measurements. In regions of low swell effects, the combination of wind speed and wave height further yields the information of wave period. The long term monitoring of these wave parameters from satellite altimeters can be used to study the wave climate of the world oceans. Examples from application to the Gulf of Mexico and the Yellow and East China Seas are presented. Using three years of TOPEX/POSEIDON continuous data, the annual and seasonal maps of the wind and wave climatology of the two regions can be constructed. Many mesoscale features can be clearly identified, and the geometric effects on the wave pattern can be seen from the wind and wave distributions.

DTIC

Artificial Satellites; Ocean Currents; Air Water Interactions; Altimeters; Climatology; Wind Velocity; Water Waves; Satellite-Borne Instruments

14
LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

19980015428 McMaster Univ., Hamilton, Ontario Canada

Tenth Biennial Hypoxia Symposium ***Final Report***

Houston, Charles S., Editor, McMaster Univ., Canada; Coates, Geoffrey, Editor, McMaster Univ., Canada; Oct. 1997; 341p; In English; 10th; Biennial Hypoxia Symposium, 18-22 Feb. 1997, Lake Louise, Canada

Contract(s)/Grant(s): DAMD17-96-I-6307

Report No.(s): AD-A330864; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

Proceedings of a Symposium on Hypoxia: Women at Altitude. Some topics include: Women, Exercise and Acute Mountain Sickness; Hypoxic Life at the Bottom of the Sea; the Regulatory Role of Myoglobin in Myocardium; Hypoxia and Air Travel; Base HACE: An Introduction; Cerebral Hemodynamics and High Altitude Cerebral Edema; etc.

DTIC

Air Transportation; Altitude Sickness; Hemodynamics; High Altitude; Myocardium; Myoglobin; Physical Exercise

19980016488

Survey on health effects due to aircraft noise on residents living around Kadena air base in the Ryukyus

Hiramatsu, K., Mukogawa Women's Univ., Japan; Yamamoto, T.; Taira, K.; Ito, A.; Nakasone, T.; Journal of Sound and Vibration; August 28, 1997; ISSN 0022-460X; Volume 205, no. 4, pp. 451-460; In English; Copyright; Avail: Issuing Activity

Results are reported of a questionnaire survey relating to a scale for general health, the Todai Health Index, in a town, bordering on a large U.S. airbase in the Ryukyus. The level of aircraft noise exposure, in the town, expressed by WECPNL, ranges from

75 to 95 or more. The sample size was 1200, including a 200 person 'control' group. Results of the analysis of the responses in terms of the noise exposure suggest that the exposed residents suffer psychosomatic effects, especially perceived psychological disorders, due to the noise exposure to military aircraft, and that such responses increase with the level of noise exposure.
Author (EI)
Aircraft Noise; Noise (Sound); Health; Risk; Noise Pollution

15
MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

19980016584 Smiths Industries Aerospace and Defence Systems Ltd., Cheltenham, UK
Mission Software - The Next 25 Years
Mayoh, Howard, Smiths Industries Aerospace and Defence Systems Ltd., UK; Future Aerospace Technology in the Service of the Alliance; Dec. 1997; Volume 2; 6p; In English; Also announced as 19980016571; Copyright Waived; Avail: CASI; A02, Hardcopy; A02, Microfiche

The growth in computing technology over the last 25 years has been truly dramatic. The techniques used to develop the software have also seen significant changes. The growth in avionics software has been no less dramatic. This paper considers the changes that have occurred, and that will continue to take place in the future, in terms of three generations of avionic computing. The First Generation covers the early application of computing to mission system applications. These mission applications were distributed over few computing centres, with very little communication between them. The Second Generation of avionics computing is characterized by a major growth in the size and complexity of the software applications. The changes we can expect over the next generation, the Third Generation, of avionic computing will be as great as those between the first and the second. The most significant change will probably be in the avionic computing architecture, in that Integrated Modular Avionics (IMA) will be at the core of the avionic computing infrastructure. The need to reduce pilot workload and increase systems performance will demand an increase in the scale and complexity of mission management applications. to achieve the growth that will be required to support these new applications a significant increase in productivity will be required. The need to develop highly integrated applications across organizational boundaries will mean an increasing emphasis on integrated teams. A combination of IMA architecture, with the growth in size and complexity of the mission systems applications, will introduce a number of software management challenges.
Author
Avionics; Computer Programs; Aircraft Instruments; Systems Engineering; Electronic Modules; Architecture (Computers)

19980014523 RAND Corp., Research Inst., Santa Monica, CA USA
Should C-17s Be Used to Carry In-Theater Cargo During Major Deployments?
Killingsworth, Paul S.; Melody, Laura; Jan. 1997; 54p; In English
Contract(s)/Grant(s): F49642-96-C-0001; DASW01-95-C-0059
Report No.(s): AD-A331827; RAND-DB-171-AF/OSD; ISBN 0-3330-2545; Copyright Waived; Avail: CASI; A04, Hardcopy; A01, Microfiche

Past analyses of the roles and missions of the C-17 have centered chiefly on its effectiveness in moving military equipment over intercontinental distances, i.e., as a strategic airlifter. In contrast, the C-17 Tactical Utility Analysis (TUA) provided an in-theater perspective on C-17 operations. RAND had two objectives in its support of the TUA: one to estimate the capacity of airfields to support air mobility operations and the other to evaluate possible concepts of operation for in-theater C-17 operations. The first objective is addressed in James P. Stucker, Ruth T. Berg, et al., Understanding Airfield Capacity for Airlift Operations, Santa Monica, CA: RAND, MR-700-AF/OSD (forthcoming). This Documented Briefing addresses the second objective.
DTIC
Transport Aircraft; C-17 Aircraft; Effectiveness; Air Transportation

16
PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.

19980014175
On the interaction of a moving hollow vortex with an aerofoil, with application to sound generation
Leppington, F. G., Imperial Coll., UK; Sisson, R. A.; Journal of Fluid Mechanics; August 25, 1997; ISSN 0022-1120; Volume 345, pp. 203-226; In English; Copyright; Avail: Issuing Activity

A hollow vortex in the form of a straight tube, parallel to the z-axis, and of radius a, moves in a uniform stream of fluid with velocity U and in the x-direction, with U small compared with the sound speed c. This steady flow is disturbed by the presence of a thin symmetric fixed aerofoil. In this paper, the perturbed velocity potential in the incompressible flow case, for the linearized equations in the limit of small aerofoil thickness, is calculated. For the important special case where the vortex tube has small radius a compared with the aerofoil width, the deformed vortex is characterized by a hypothetical vortex filament. Finally, the distant sound field is estimated, representing the aerofoil by a distribution of moving monopole sources and representing the effect of the deformed vortex in terms of compressible dipoles along the mean center of the vortex.
EI
Sound Generators; Vortices; Aerodynamics; Velocity; Mathematical Models

19980016479
Annoyance by aircraft noise around small airports
Rylander, R., Univ. of Gothenburg, Sweden; Bjorkman, M.; Journal of Sound and Vibration; August 28, 1997; ISSN 0022-460X; Volume 205, no. 4, pp. 533-537; In English; Copyright; Avail: Issuing Activity

Studies on annoyance caused by aircraft noise exposure were undertaken in eight areas near three small and medium sized airports to assess the validity of a previously developed principle to express the relevant noise exposure. The results showed a dose-response relationship for the extent of annoyance when the noise exposure was expressed as the number of noise events greater than or = 70 dB(A). The maximum noise levels did not influence the extent of annoyance. The practical application of this principle for control of aircraft noise is illustrated.
Author (EI)
Aircraft Noise; Noise (Sound); Noise Pollution; Airports

19980016842 National Aerospace Lab., Amsterdam, Netherlands
Effects of Asymmetric Inflow on Near-Field Propeller Noise
Schulten, J. B. H. M., National Aerospace Lab., Netherlands; 1997; 17p; In English; 1st; Aeroacoustic Conference, 12-15 Jun. 1995, Munich, Germany
Report No.(s): PB97-178826; NLR-TP-95136-U; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The interior noise of jet aircraft can compete with luxury cars. Propeller driven aircraft, however, generally suffer from an unpleasantly loud cabin noise. The aerodynamic and acoustic effects of non-axial inflow on wide-chord, advanced high speed propellers are studied by means of a lifting surface theory. Starting from the flow equations for a perturbed, axially subsonic flow, expressions are derived for the pressure and velocity field of a propeller. by using a Green's function representation in separated, cylindrical coordinates the boundary condition at the hub is naturally incorporated.
NTIS
Aerodynamic Characteristics; Aerodynamic Coefficients; Aerodynamic Noise; Subsonic Flow; Asymmetry; Jet Aircraft; Propeller Noise

17
SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law, political science, and space policy; and urban technology and transportation.

19980015413 National Archives and Records Service, Office of Federal Register, Washington, DC USA
Code of Federal Regulations: Aeronautics and Space, Title 14
Jan. 01, 1997; 345p; In English

Report No.(s): PB97-165997; No Copyright; Avail: CASI; A15, Hardcopy; A03, Microfiche

This paper contains the following sections: Explanation; Title 14, Chapter I-Federal Aviation Administration, Department of Transportation (Continued); Finding Aids, Material Approved for Incorporation by Reference; Table of CFR Titles and Chapters; Alphabetical List of Agencies Appearing in the CFR; and List of CFR Sections Affected.

NTIS

Regulations; Air Transportation; Aeronautics

18
SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radation.

19980012508 NERAC, Inc., Tolland, CT USA

Galileo Missions. (Latest citations from the INSPEC Database)

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The bibliography contains citations concerning Galileo missions to the Jovian system. Infrared mapping of the Jovian system and multispectral imaging of Earth are examined. The flight performance of the Galileo orbiter is discussed.

NTIS

Bibliographies; Galileo Project; Infrared Imagery; Mapping; Flight Characteristics

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